The Builder.

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Architects and Sanitation.

CHARGES have been made against the architectural profession at the Sanitary Congress in Exeter, as well as elsewhere previously, which a large proportion of the profession will do well to consider seriously. It has been asserted, and the assertion has been accompanied by circumstantial statements, that certain buildings erected in quite recent years are no better off in sanitary provision than those of what may be called the pre-sanitation period: that buildings of a class which ought to have presented specially healthful conditions,—hospitals or convalescent institutions, public offices, and other large establishments of that description, built under the superintendence of architects of standing,—have been found so deficient in the requisite provision for, amongst other things, efficient drainage, that they have had to be closed, and the drainage system reconstructed within a very short period from the time of their being built, to prevent them from becoming institutions for fostering and spreading disease rather than contending against it. We have not the names of the architects given, and it is quite possible that if we had them, we might find they were not among those who are recognised as leading members of the profession; though we must not feel too sure even of this. When we hear, as we have done, of an eminent "art-architect" declining to visit the site of an intended house before planning it, as it was a matter of no consequence, we can hardly refuse to believe any statements of the kind we have alluded to on the ground of inherent improbability. It appears, at any rate, that there were recognised architects employed in the cases brought forward by Mr. Burdett in his communication, and that in two of these cases, at all events, the architect had unlimited funds at his disposal, and was free to do as he pleased. Yet we are told (and Mr. Burdett, a member of Council of the Sanitary Institute, made himself responsible for the truth of the statements) of drain-pipes beneath the building, soil-pipes inside, baths, lavatories, and sinks opening directly into the sewer, many of them untrapped; and no plans of the drainage existing. Drains laid with irregular falls, and in some cases falling the wrong way, formed other items in the indictment. This latter defect (one of very frequent occurrence) is, however, not one of those which in general can be rightly charged upon the architect. He, almost as a matter of course, will direct that the drains be laid with a "proper" fall, if not a specific minimum fall; but for the observance of such directions he is necessarily at the mercy of workmen and clerks of works. An architect cannot examine and test the levels of all drains in a large building as they are laid; and if clerks of works are negligent, or if workmen will do things clumsily or dishonestly, the fault is with them, and not with the architect, who is entitled to expect at least a decent amount of common honesty and comprehension of their business on the part of the contractor's foremen and labourers, and proper attention on the part of the clerk of works to ensure that his orders are properly carried out.

In such matters as the latter, therefore, the architect may be, and often is, unfairly blamed for what is due in reality to bad or dishonest workmanship. But in regard to other charges brought in Mr. Burdett's paper, those which involve the employment of a right or wrong system in the contrivance of drainage, the architect is unquestionably the responsible person, and we fear he is in many cases very responsible indeed for a great deal which he ought to have prevented. We may say that we do not very much doubt the general correctness of the facts mentioned by Mr. Burdett in regard to the three specimens of building which he mentioned. It would, however, have been more thoroughly in the interests of truth to have specified the buildings by name, so that charges might have been met or answered where there was good ground for answering; but this might have made the reader of the paper answerable for libel in the eye of the law. A man making statements in regard to a case which is not named or defined is under great temptation to "put it strong," and to make charges in a sweeping manner which may in reality be only true partially and in detail; and we must allow for this in regard to the remarks we are now commenting on.

Statements such as those made were, of course, followed by a general abuse of architects, an amusement which sanitary reformers, editors, and leader-writers never want much encouragement to enter upon. We may be allowed to caution indignant sanitarians and their audiences, however, against supposing that all architects are ignorant or careless about sanitary arrangements, because very bad charges have been preferred against "some person or persons unknown" in the profession. In reply to the general persuasion that seemed to be adopted by the members of the Sanitary Institute, that the architects are at the bottom of all the bad drainage and ventilation, or are at best indifferent about it, we may be allowed to say that a large proportion of the sanitary reforms of the day were originally inaugurated in the pages of this journal, conducted by an architect, and that many of them were urged by us over and over again, through long years, in the strongest terms, before any notice whatever was taken of them. And if those newly-enlightened enthusiasts among the press and the public who think they are empowered to lecture the whole architectural profession on their duties, were to be a little more careful about facts and justice in their accusations, they would find that there is a proportion at least of the architects who are fully alive to the importance of sanitation, give it every attention, and are the inventors of arrangements bearing upon it. But they are always forgotten or ignored when the subject comes up, and the whole profession are attacked as if they were all alike indifferent to the subject.

This is certainly not the case, and it is only our duty to our natural clients, the architects, to say so plainly. But, on the other hand, we should be equally wanting in duty to them and the public if we did not also say that there is obviously among a proportion of the profession a lamentable and almost culpable indifference in regard to this important branch of practical architecture. The reason for this is, to a great extent, to be found in the turn for the picturesque in architecture which has been developed in so marked a manner of late years. There has been a curious series of changes in the way in which the practical and the picturesque have been regarded by architects at different periods. During the time when what we now call picturesque architecture was being produced,—when castles and monasteries were built,—the picturesque was probably hardly in the thought of the designer, in the case of castles more particularly; the building was simply the best that could be done, and the sanitary arrangements were probably also the best that could be provided with the slight knowledge and rude means which the period allowed. There is evidence that, in conventual buildings, great regard was paid to sanitary arrangements as far as the removal of refuse is concerned (though personal cleanliness may have been little regarded), and the very absence of our contrivances of traps and pipes obviated also some of the dangers against which we have to guard. In the flat period of architecture which followed the fall of Mediæval art, the picturesque, conscious or unconscious, for a while disappeared; but there was, during this period, more sound and honest building, on the whole, than at any other time, and the sanitary side of the question seems to have been properly taken into account still, so far as the knowledge of the period extended. In the present generation we find a conscious effort at picturesque architecture, combined with a frequent indifference as to sanitary provisions, at a time when far more knowledge and experience, and far better machinery, are available for sanitation than at any time previously.

The root of this indifference to so important a part of the architect's work is to be traced, we really believe, in a great measure to the taste for "picturesque" and imitative architecture which has possessed so large a portion of the profession, and which is much fostered and encouraged by the portion of the public who profess to have a taste. With those so influenced, architecture, instead of being the study how to build best for practical needs and for appearance combined, is the study how to turn to account a number of sketches from old buildings, and

how to realise their peculiar effect most faithfully. Those who make this the one object find a large public to encourage them in it, a public which is very indifferent how a house is planned, drained, or ventilated, so long as it presents the peculiar kind of picturesqueness which is desired; and a public which displays this taste can hardly complain if its demand is supplied, and must at least share some part of the blame with the architect, though it is true that the latter ought to endeavour to educate his public rather than be led by them; but that is easier said than done.

In short, the want of attention to sanitary conditions on the part of some architects is simply one of the many ill results of looking at and practising architecture from a radically wrong point of view, from the sentimental and not from the practical point. If the young architects who fill sketch-books with bits of picturesque building for "home consumption" would, before running after this ornamental part of the profession, however commendable in its turn, fill notebooks with practical and sanitary observations; if they went abroad to see where to get hints for improving construction, arrangement, ventilation, and drainage, instead of merely to obtain new "notions" in the picturesque of gables and turrets, there would be some chance that the former would receive proper attention when the results of study came to be put into practice. As it is, the study is merely on the picturesque, and when facility in that has been acquired, sanitary matters have to be looked to as a mere afterthought, or trusted to the experience of the builder. This sounds very bad, but we repeat that the public who demand the seeming rather than the real in architecture, and make no demand for sanitation, cannot reasonably complain if they get what they demand. But the remedy is that architecture should be regarded as it always was in the best times of its cultivation, as a matter of practical building in the first instance, and of beautiful expression in the second instance only. The idea of turning over sanitary questions to engineers or specialists, and leaving the architects in undisturbed possession of the picturesque, which has been suggested, is the very worst that could be entertained, and the most utterly suicidal thing which the architectural profession could do. People may get tired of the picturesque, or change their ideas and tastes about it; but they are likely to become increasingly exacting about sanitation, sound construction, and economic requirements; and these are considerations which will always remain the same. Let the architects be content to relegate the picturesque to its proper place, and direct their minds towards attaining well-placed, well-planned, well-built, well-drained, and well-ventilated buildings in the first instance, as the *sine qud non*, after satisfying which they will be at liberty to look after the picturesque with a clear conscience. Unless they restore this true balance of professional work, and do it speedily, they will have reason to repent of their shortcomings; for the public are gradually being awakened to the pressing need of improvement in the sanitary construction of buildings, and they will insist on having it.

A Big Picture in Guildhall.—The Lord Mayor last week ordered a painting, 100 ft. long and 30 ft. deep, containing over 1,000 figures, to be hung in the Guildhall. It was painted by Sir R. Kerr Porter, and presented to the Corporation in 1819. Porter was born in 1775, and in 1790 obtained admittance as a student of the Royal Academy through Sir Benjamin West, then president. In 1792 the boy artist received a commission to paint "Moses" and "Aaron" for Shoreditch Church. In 1794 he presented an altar-piece of "Christ allaying the Storm" to the Roman Catholic Chapel in Portsea, and in 1798 he gave to St. John's College, Cambridge, a picture of "St. John preaching in the Wilderness." In 1800 he exhibited an immense picture, 120 ft. long, in the Lyceum Great Room, representing the Storming of Seringapatam, and in the same place, in the following year, another gigantic battle-piece, "The Siege of Acre." These were followed by a third colossal work, "Agincourt," which he presented to the City of London, and which is the picture now disentombed. Some years ago it hung in the Guildhall, where it is now again exhibited in three portions, and in a somewhat ragged condition. A committee has been appointed to consider as to cleaning and restoring it.

A NEW CHAPTER IN ART.

The discoveries made by Sir Henry Layard in Assyria and Babylonia opened up a new chapter in the history of art, and they have since been supplemented by the discoveries made in Cyprus, Phœnicia, and on the sites of Troy and Mycenæ. These discoveries have shown us that Greek art, long believed by some to be like its great patroness, Minerva, a full-born product of the land of Zeus, was but the culmination of a long series of art developments extending over centuries of time. Just as we see in geology some lofty table-land which seems, as it were, to be a huge altar of nature's God, built up layer by layer by the slow bricklaying of centuries, so the art which culminated in the divine sculptures of Phidias and Polycletus was but the last of a stratified series of art periods, each one developed from its predecessor.

The more we regard the discoveries of the last few years in almost every branch of research, either of the historical or natural sciences, the more we see the extent to which the law of development and evolution is applicable. The application of the doctrine of comparison, and the birth of the comparative sciences, is establishing each day more surely our knowledge of the laws which govern and guide the growth of art and religious culture.

Some two years ago * we pointed out the importance of following out the new evidence thus afforded to us of the westward spread of art and culture, and we indicated at the same time that there were other than Phœnician channels which conveyed the art, mythology, and civilisation, the "learning and wisdom of the Chaldees," to the shores of the Ægean sea and to the early seats of Greek civilisation.

The important explorations made by Dr. Schliemann at Hissarlik and Mycenæ have revealed to us the substrata of pre-Hellenic, and the first strata of Hellenic, culture which underlie the acropolis of Greek art. In these treasures of early Trojan and Greek art we find forms and modes of decoration similar to those current in Babylon, and evidently borrowed from the Chaldean artists. The presence in Greek mythology of legends of the gods and goddesses which are manifestly echoes of the mythology taught in the schools of the Babylonian prophets again is a point which needs explanation. Whence comes this similarity? Was there any historic contact? Is there a chain which connects Troy and Mycenæ to distant Babylon?

The ancient historians all agree in stating that long before Greek influence had penetrated into Asia Minor there had existed a comparatively high degree of civilisation among the states of the barbarians. The Teucrians, Mysians, Dardanians, the allies of the Trojans, were all skilled in the art of war, and were no mean contrast to the beleaguers of Troy. The Lycians, Carians, and the tribes of Solymes and the Cilicians had come in contact with the mariners of Sidon, and thus may have contracted many germs of culture; but in the interior of the peninsula, on the banks of the rivers Sangarius and the Halys, there were tribes who had developed some degree of civilisation, and attained to a fair standard of culture, as shown by their monumental remains. These were the tribes of Phrygia and Galatia, and the precursors of the Lydian empire. Whence came the civilisation of these tribes, and what part did they play in the westward spread of culture?

The annals of the kings of Egypt and Assyria, which have been recovered from the graves of buried temples and palaces, have not only restored to us the history of their own lands, they have also thrown much light on the history and civilisation of the neighbouring nations with whom they were brought in contact. These copious annals from temple and palace wall, from lengthy papyrus rolls and polygonal cylinder, are moreover, supplemented and illustrated by a vast picture-gallery of painted or sculptured tableaux, all of which help the more to bring before us the types and characters of those with whom the great kings warred. The long and accurately-compiled lists of spoil and tribute which defeated barbarians rendered to the conquering king furnish us with important data as to the products, both natural and artificial, of the lands of the defeated ones.

From these monuments we learn that more than eighteen centuries before the Christian era the highlands of Syria, the fertile districts to the west of the Euphrates, and the plains watered by the Sadjur, Ifrin, and the Orontes, with the slopes of the Amanus and Taurus mountains, were occupied by a powerful confederation of tribes. These people, known to the Egyptians as the Kheta, and to the Assyrians as the Kattai, are the Khittim, or Hittites of the Hebrew writers. They were a race who had been almost obliterated from the roll of history, and yet we find them a civilised and highly-cultured race, and no mean factor, not only in the politics of Western Asia, but also in the spread and development of civilisation.

The earliest record of these people is in the astronomical and omen tablets of the time of Sargon I., the king of Agane, a district of Babylonia. This monarch warred in Syria, and even carried his arms as far as "the land in the midst of the sea of the setting sun," by which we may recognise the island of Cyprus. Scanty as are the fragments relating to the history of this energetic and warlike king, we shall find that his reign was an important epoch not only in Babylonia, but in Western Asiatic history. From the Hebrew book of Genesis we learn that at the time of Abraham's settlement in the land of Canaan, the Hittites had a settlement at Hebron, and Abraham purchased the cave of Machpellah from Ephron the Hittite. The record of this transaction, as recorded in the twenty-third chapter of Genesis, is very important, as it would seem to indicate that contact with Babylon had left its impression in the adoption of the commercial code of Babylon. The minute specification of the land, and the details of purchase, read remarkably like the text of a Babylonian contract tablet.* The silver tariff, and the market-place being the gate of the city, all seem to indicate that Babylonian commerce, and with it the laws and precedents of trade, had been brought into Syria, and were familiar not only to Abraham, the native of Ur, but also to Ephron the Hittite. The chief city of the Hittites was the city of Carchemish, called by the Egyptians Qir-Qamash, and by the Assyrians Kar-Gamis or Gargamis. This city was situated on the Upper Euphrates, about ten miles above the mouth of the tributary Sadjur, the Sagur of the inscriptions, and on the west bank. The importance of the site was first recognised by Mr. Skene, the English consul at Aleppo, and afterwards by Mr. George Smith, upon whose recommendation the trustees of the British Museum commenced a series of explorations of the site, which have brought to light many antiquities of the Hittite founders. The modern name of these extensive ruins is Jerablús, a name which is manifestly a corruption of the Greek name of the city, Hierapolis, "the sacred city" of Atargatis, the Asiatic goddess. The ruins are over 8,000 ft. in circumference, and there are distinctly to be traced the walls, gates, and citadel or acropolis, all marked by lofty ramparts of earth, the graves of fallen Carchemish. The city was bounded on two sides, the north-east and south-east, by the broad stream of the Euphrates, which washed the quays, now some distance from the water, owing to the rapid growth of the alluvial. The city was protected on the land side by lofty walls and gateways in the strong flanking towers. In many respects the site chosen is one admirably fitted to be occupied by a great city such as the Hittite capital was. The river affords a broad highway, down which passed the rich mineral and other products from the regions of the upper Euphrates. At Carchemish was gathered all the wealth of Syria, Phœnicia, and Asia Minor to be transmitted by the Euphrates to Babylon and the cities of the Chaldees. Here a mile or so south of the city is the ford where the caravan which passed to Nineveh and the cities of the Tigris crossed the stream, and from its position we can plainly see how fitted Carchemish was to be the emporium of Syria. Not only from the above considerations is the spot fixed on suited to be the seat of a great city. From a military and strategical point of view, few sites were better fitted to be the capital of a nation. Situated as it is on a promontory jutting out into the Euphrates, from its lofty Acropolis which towers a hundred feet above the water, an extensive view is obtained of the course of the river and of the country on either bank. An inspection of the ruins at once shows them to be the work of a people who were skilled not only in offen-

* See vol. xxxvi., p. 1161, "Syrian Archæology."

* There are contract tablets dated in the reigns of Eriaku (Arioch) and Kudur Lagamar (Chedorlaomer) in the British Museum.

sive but also in defensive warfare. The most important feature in the topography of the city is the mound-built Acropolis, which is on the north-east face of the city. It is interesting to find these mound-built citadels forming so important a feature in the topography of the Hittite cities, as we have long been familiar with them in the plains of Babylonia, where in every city they are to be found; and we may suppose that in both systems of building they had a similar origin. In Babylonia we know they were the work of the Akkadai or mountaineers, who, when they descended to the plains of Babylonia, built these lofty towers in remembrance of their mountain home, and there are many facts which lead us to assign a similar origin to the towers of the Hittites. Excavations on the sites of most ancient cities, such as Troy, Mycenæ, and others, have shown that, as in geology so in archæology, the *débris* is, to a certain extent, deposited in regular strata. We referred to this in a former article, and suggested that when explorations should be made on the site of the Hittite capital we should find ruins of many occupants. The city, whose foundation was probably as remote as that of Nineveh, has had for its occupants and possessors almost every one of the great nations of antiquity. Egyptian and Assyrian, Babylonian, Persian, Greek, and Roman, have planted their banners on the walls of the city, and each has "thrown down and dug up" the palaces and temples of his predecessors. It is, therefore, not surprising that we find the ruins of a most chaotic nature. Standing within the inclosure, the ruins can be described by no other term than "confusion on confusion heaped." Here an open excavation reveals to us the relics of the early Hittite founders, in quaint bas-reliefs; close adjacent are the bases of Roman and Greek columns, and the remains of an ancient Arab town cover a portion of the ruins. Amid such a sea of *débris* no plan can be traced with any degree of certainty, but, nevertheless, excavations have shown that through all disturbances, relics of the Hittites have been preserved to tell of those who, centuries ago, built on this spot the "city of Kemosh."

To pass now to the excavations which have been made, and to relics of the past which have been recovered. The chief and most extensive excavation has been made on the south-east face of the great mound, a short distance from the base, and within the *enceinte* of the city. Here the workmen have laid bare a long narrow corridor resembling those in the palaces at Nimrod uncovered by Sir Henry Layard. The portion uncovered is about 60 ft. long, and from 18 ft. to 20 ft. in width. It appears to have been a long flight of steps leading down from the palace mound to the city. The west wall can be distinctly traced by the plinth which remains, and on which some sculptures are still found *in situ*. The east wall has been destroyed, and many fragments of broken and crushed sculpture are found on that side of the excavation, but the line of the wall could not be traced. Near the southern extremity of this corridor a doorway is found in the line of the east wall which admits into a small chamber only partly excavated, in which is a fine sculpture standing on its plinth. Before proceeding to describe the sculptures found in these excavations, it will be necessary to say one word about the material used. In the majority of cases these Hittite sculptures and inscriptions are cut in hard black basalt, which has been brought from considerable distances. The stones bearing the so-called Hamathite characters, found at Hamah, the sculptures at Carchemish, with two exceptions, and the work at Tel Arjad, the ancient Arpad, as well as the Hittite remains at Eyuk in Galatia, are all cut in this hard stone. The cutting is of a peculiar character; it does not present an appearance of tooling, and there are but few marks of the chisel; the stone has a peculiar pulverised appearance. This is especially noticeable in the inscriptions which are cut in relief. As there are now examples of this sculpture in the British Museum, it may be of interest if they were examined by some expert, as they certainly exhibit a surface-working different to any yet seen. It is strange, indeed, to note this preference for the hardest material which is exhibited by the monument-makers of primitive nations. The Egyptians present us with the Sphinx carved out of solid granite, so hard that the best English tools turn upon it. The early Babylonians cut statues in black basalt and black granite of the hardest possible texture. The great statue of Gudea, one of the earliest kings of Babylon, whose date is probably nearly contemporary with the reign of the eleventh Egyptian dynasty, is carved in solid basalt, so hard that after more than four thousand years of wear hardly a character in the inscription is illegible. Among the sculptures at Carchemish are two cut in limestone, but there does not seem to be any difference in date of any great importance between the art periods of either class of sculpture.

The first sculpture to which we will direct attention is a large limestone bas-relief, measuring 9 ft. by 7 ft. 6 in. when perfect, but now unfortunately broken in half. The sculpture, when perfect, represented two figures,—deity, and an attendant priestess who adores or worships the goddess. We see here a very interesting tableau, evidently illustrative of the worship of the great goddess of Carchemish Dea Syria,—Atargatis or the Asiatic goddess. This is evidently the Hittite goddess whose name is given in the treaty between Rameses II. and the Kheta as "Astartha of the Kheta." The figure is nude, and full face to the spectator. The goddess wears the Hittite headdress, which consists of a lofty conical cap, the apex of which is decorated with a horned crescent, and in some cases with the solar disc in the centre of the crescent. From the shoulders rise a pair of wings. The hair is braided in two long plaits, and falls over the breasts and shoulders. The arms and hands are well carved, and the latter support the breasts of the goddess, which are represented as full. The face is much mutilated. The priestess who ministers to the goddess is represented as clad in a long kind of robe, which covers the head and the body, being confined at the waist by a girdle. This dress appears to have been the ordinary costume of the Syrian or Hittite women, as we find it frequently represented in the Assyrian sculptures.* The girdle which circles the waist is the most curious feature in the sculpture. It consists of two cords, or a double cord, which circles the waist, and is fastened behind. This was evidently the sacred cincture or girdle of the priestesses who were dedicated to the worship of the goddess. Both the priestess and goddess wear long locks and bracelets on the arms. The sculpture now recovered explains the source whence came the cult of the Asiatic goddess which the Greeks found established in Asia Minor, and which they identified with the worship of Artemis. The chief centre of this worship in classic times was Ephesus, where the Ephesian Artemis, Diana of the Ephesians, had her temple. It has long been known that originally the cult had its origin in Babylon, in the worship of Anat, or Anatis, the consort of Anu, the Babylonian Zeus. In her temple at Babylon we learn from both Greek† and Hebrew‡ writers that the women sat in the courts with cords about their waists, and burning bran,§ awaiting release by sacred prostitution from their vow to the mother goddess. It was this distinctive cord which we see worn by the priestess of the goddess here represented. Istar, "the goddess," was the daughter of Anat, and in time usurped many of the attributes of her Babylonian mother. Under the Assyrians, however, the worship of Istar received a mythology far more elaborate than either that of Istar of Babylon or Anat, and many of the stories which were current of the Phœnician Astarte and the Cyprian Venus were of Assyrian origin, and essentially related to Istar as the goddess of love and pleasure.

Still, however, we find Istar intimately relates to one important cycle of Babylonian legends, namely, the stories of the hero Gisdubar, of Nimrod. In her war against Gisdubar and the chieftains of Erech we have a proof that she was the soldier queen. In this character she appeared to Assurbanipal, and presented him with the sacred bow which was to lead him to defeat his enemies. Here she resembles very closely the Amazon queen, Omphale, the companion of Heracles. We now see, by this brief *résumé* of the myths of Istar and Anat, the importance which this Hittite sculpture receives, because, by its presence, we may consider that, as the worship of the Babylonian goddess came to Carchemish, so did many of the myths relating to her.

* Botta, pl. 92, b.; and Layard's Mon. Nin., series 1.
† Herodotus. ‡ Baruch, n. vi. 43.
§ Theocritus states that burning bran was one of the love potents of the Greek women. Horace also refers to it as being a charm used by the Roman women.

The question now arises, what historic connexion is there between the Hittites and the tribes of Asia Minor, which would lead us to assign to them the introduction of the worship of the Asiatic goddess into Asia Minor?

In the reign of Rameses II., the Sesostris of the Greek writers, a powerful confederation of Syrian and Western Asiatic tribes opposed the advance of the hosts of Egypt through the gateway of North Syria, the valley of the Orontes and Litany. From the Third Saltier Papyrus,* we gather an account of the great battle which took place near Kadesh, and ended in the total defeat of the allies. The papyrus also gives us a full catalogue of the forces of the Hittites and the allies. We have "the chief of the Airatu, the chief of the Masu, the chief of the Iruna, the chief of the Leka, the chief of the Tautani, the chief of the Kaskash, and the chief of the Kairkamash and the Khirabu, the allies of the Kheta all banded in one, 2,500 chariots"; and from other fragments we learn that there were the tribes of Patasu, Asi, and the land of Maten.† The researches of M. Lenormant and the Vicomte de Rouge have done much to identify the people who thus were allied against the Egyptian conqueror. We find the Arvadites (Airatu), the Mysians (Masu), the people of Ilion (Iruna),‡ the Lycians (Leka), the Dardani (Tautani§), the people of Asos (Asi‖), and Pedasos (Patasu), with the Matieni (Maten‖). These are the tribes which we see united with the Kheta, the people of Carchemish and Helbon (Khirabu). This identification would seem somewhat uncertain were it not substantiated by an interesting monumental discovery that proves the presence of the Hittites in Lydia, near Sardis. During a tour in Asia Minor last year, Professor Sayce saw on one of the pseudo Sesostris which are carved on the rocks in the woody pass of Karabel, on the road between Ephesus and Sardis, an inscription written in curious hieroglyphic characters. The inscription consists of seven characters, and of these seven six are to be found on the monuments from Carchemish. There are two of these figures, but on only one does the inscription remain. Herodotus records these statues, but the good and credulous old man seems to have confused his notes regarding them. He states with regard to the statues that he was unable to tell who had erected them until he came to Egypt, then all was made clear to him, and he assigned them to Sesostris. Oh, strange reversion of fact, when archæology now proves them to have been erected by the opponents of the mighty Egyptian, the vile Kheta or Hittites. A broken bas-relief of Hittite soldiers and a figure of an archer in the British Museum, all from Carchemish, furnish every detail of the statues at Karabel. The conical or Phrygian head-dress, the turned-up shoes, the short kirtle, and the peculiar form of bow, are all found in Carchemish sculptures. Thus on the very meeting-ground between Greek and Asiatic culture we find a statue of these Hittites, whose capital was one of the chief seats of worship of the Asiatic goddess.

From the classic writers we know that the Ephesian Artemis was represented as having many breasts, and to which were represented clinging lions, cows, stags, bees, and crabs. This was but an exaggerated form of the full-breasted "mother goddess" of Babylon, whose statue we find at Carchemish. Many statues of this goddess are found in Babylon, where they were deposited as *ex votos* in the temples of the goddess. The whole cultus of the worship of the "Asiatic goddess," or of the Ephesian Artemis, exhibits many peculiar features, all indicative of its non-Hellenic origin, but none are more striking than the strange construction of the hierarchy attached to the temple of the goddess.

From Pausanias¶ we learn that the chief priest attached to the temple of the Ephesian goddess had the title of Essen (Εσσήν) "the king bee," while the priestesses, the prototypes of the Amazons, had the title of Μελισσαι, "the bees."

It is evident that this hierarchy was a sur-

* Translated by Professor Lushington in "Records of the Past," vol. ii., pp. 65–78, and Brugsch, Hist. Egypt, vol. ii., p. 53.
† Tribes on the east bank of the Halys.
‡ The pronunciation of l, n, and r in the hieroglyphic syllabary render this identification possible,—Iluna, or Iruna.
§ Dardanai, *ibid.*
‖ These tribes appear in the annals of Thothmes III.,—two centuries earlier.
¶ Pausanias, book viii., xiii.

vival from pre-Hellenic times, and we see that it has left its mark on the art of Ephesus, by the bee, as the sign on the coins of that city.* Many attempts have been made to explain the origin of this hierarchy and symbolism, but, until now, no satisfactory explanation has been afforded. The discovery of Hittite art and inscriptions as applicable to the early civilisation of Asia Minor has afforded us a solution.

It will be remembered that one of the most interesting, and, at the same time, most prolific classes of Western Asiatic art remains are the small engraved cylinder signet seals.† From Babylon, Nineveh, Phœnicia, and Cyprus we have obtained examples of this class of art-workmanship. Among the specimens of this work in the British Museum are some of Hittite persons, probably merchants trading in the marts of Assyria. In the possession of Signor Tomassini, at Aleppo, there are several very interesting specimens of this class of gems, and as these have been mostly obtained from Arabs and merchants in the locality, they are the more important.

The gems have been arranged in three classes, Babylonian and Assyrian, Phœnician, or composite. There is a class of these gems which exhibit a curious blending of the styles of art in vogue in both Egypt and Assyria. We find this incongruous fusion of the arts of two or more countries chiefly in the gems of Phœnician origin, and examples of these are found in most museums. Some very curious ones were discovered by Gen. di Cesnola in Cyprus. In this class of gems the skill of the artist would seem to have been employed to the utmost extent in producing as strange and *outré* a mixture as possible. In one case a Babylonian cylinder has been the basis, but Egyptian griffins and figures have been introduced into the scene, and by a process of conventionalising a cuneiform inscription has been turned into an artistic border. In another example an Egyptian inscription is treated in a similar manner. It has been usual to class all these complex or mixed style seals as the work of Phœnician artists, as we know they were in the habit of producing most bizarre fusions of styles to suit their patrons, as shown by the bronze bowls from Nineveh, Cyprus, and Palestrina. But some of the gems in Sig. Tomassini's collection exhibited symbols and forms not hitherto met with in their class, and thus furnished us with a new division. Several of the seals contained scenes illustrative of the adventures of the goddess Istar, the type of the Hittite Astartha. In one we see the goddess nude, with pendent locks and hands supporting the breasts, standing on the back of a couchant bull. She is placed in a species of shrine, above which is the winged solar disk; on either side stand a priest and priestess in adoration. The priestess is clad the same as the figure from Carchemish. She has the long locks, and the sacred girdle showing her dedication to the worship of the goddess. The figures here are almost exactly similar to those met with at Carchemish. We now pass to a second gem of Hittite origin. In this we have represented the adoration of the sacred tree,—the palm in Babylonia, the pine in Assyria and Syria. Here the tree is represented with the winged solar disk above it, and a group of attendant priests, priestesses, and worshippers artund it. The priest wears the lofty head-dress similar to that worn by the goddess at Carchemish, and by the Pseudo-Sesostris at Karabel. He has turned up shoes, and *is standing on the back of a bee.* It will be remembered that one of the forms of worship which the Asiatic goddess assumed was that of Cybele, whose worship, like that of the Ephesian Artemis, was of pre-Hellenic origin, and whose great temple was at Sardis. As the nature goddess, the Asiatic "mother goddess" had the tree for her symbol, and the early statues of the Ephesian goddess were the trunks of trees, and her shrine in the hollow tree; while Atys, the Phrygian and Lydian Adonis, who offended Cybele, was changed by her into a fir-tree. Again, we note that the early statues, or symbols, of Ashtaroth, the Sidonian goddess, were pillars of wood or trunks of trees. We therefore find here in the Hittite country a seal representing one important phase of the worship of the Asiatic goddess as current at Ephesus under the form of Artemis, and at Sardis as Cybele, while the symbol of her priesthood is that of the Hittite priesthood. The discovery of these art-remains opens up a new chapter in the art of pre-Hellenic Asia Minor, and throws new light on the discoveries at Troy and Mycenæ.

We are not going to review the war which has raged over the heads of Hera-Boopis and Athene Glaukopis, but there are some points connected with the worship of the former on which these new-found Hittite antiquities throw additional light.

We have shown that the worship of the Asiatic goddess was a compound of the two systems of Anat and Istar, which had been blended by the Hittites into one, and those myths relating to either goddess became the property of the Asiatic goddess. Hera, the wife of Zeus, corresponds to the Babylonian Anat. In the war between the gods and the giants, when the former took the form of animals, Hera took the form of a white cow.*

When Istar waged her war against Gisdubar, the Babylonian Hercules, the father of giants, Anu and Anat created for her a bull which should destroy the hero.† In the gems, both Babylonian, Assyrian, and Hittite, we find Istar represented standing on the back of the sacred bull. In the temple of the Asiatic goddess at Eyuk, in Galatia,‡ the bull appears as a symbol. In Mycenæ, the seat of the worship of Hera, Dr. Schliemann has found a fine work of art in the head of a bull,§ and also a number of statuettes of Hera, with full breasts and a polos on the head. May not this worship have had its origin in the assignment of the bull as a symbol of Istar, and be a survival of the bull created for her by her mother Anat, the Babylonian Hera? At Ilion, again, the cow or bull-headed emblems of the Asiatic goddess were found by Dr. Schliemann. So it may be that the Iruna, or Iluana, allies of the Kheta, may have borrowed the symbol from them. Among the objects of tribute received by Thothmes III. from the Kheta was a "silver vase in the shape of the head of a bull."

The stag, the emblem of Artemis, and, possibly, the descendant of the gazelle, which attends the Babylonian Istar, appears on the whorls found by Dr Schliemann at Troy, as does also the fir-branch pattern found on the robes and in the inscriptions from the Hittite country; while on the seal found by Dr. Schliemann, at Mycenæ, we have an interesting representation of a feature in the cult of the Asiatic goddess; but this will be best considered when, in another article, we deal with the questions of the introduction of these legends into Asia Minor.

On the data which have thus been gathered from the art-remains furnished us by explorations in Carchemish and other primitive cities, we may conclude that certain phases of Babylonian and Asiatic culture were communicated to the Greeks by other channels than the Phœnician,—by whom, and through what channels we hope to consider in our next article, which will form the continuation of this new Chapter in Art.

* Head's Coins of Ephesus.

† The cylinder seal was introduced in Egypt about the time of the 12th dynasty, and was probably of Asiatic origin.

* Ovid, Metam. v. 330.

† In the sixth legend or labour of the hero Gisdubar (W. A. I. iv., pl. 481).

‡ See Perrot and Guillaume, "Exploration de la Bithnye et de la Galatie."

§ The head discovered by Dr. Schliemann is undoubtedly that of a bull, not a cow.

A PATRICIAN VILLA.

Perhaps few more remarkable instances of the successful collaboration of the architect, the painter, and the sculptor,—a custom of the past too much neglected in the present day,—exist than is to be found in the Villa Barbaro in Venetia; for here the sister arts have all combined to produce that general effect which it should be the endeavour of every work of art to attain.

The Villa Barbaro is a building not unfamiliar to many members of the profession: it has more than once been cited as a specimen of the luxurious life led in the sixteenth century by the Venetian nobles; not a "villa" such as seems to be the ideal home striven at by successive generations of builders for the residence of equally successive and successful generations of honest *bourgeois*, but a villa many of whose practical features are worthy of consideration and adoption at a time when it is evident in every city that the number of persons who desire to live out of town is largely on the increase.

It is at no great distance from Venice, this villa of which we speak, and only a comfortable drive from the town from which we at present write, on the fine old high road which runs from here to Montebelluno, and so into the Venetian mountains, on whose southern slopes the villa is delightfully situated.

Nor is the approach less enchanting as one reaches the skirt of the plain and gradually ascends. When the visitor has left the gently-rising hill of the dark and now bare Montello, he spies in the distance, duly pointed out, the villa at Maser. It is a luscious country side, for here are the vineyards that produce the famous Rosolio, which the last generation held in such esteem. Soon appears, growing more and more distinct, the villa Giacomelli, the gardens, surrounded by their low walls, adorned with numerous statues, the hill-side covered with trees and vines, from which peep out here and there the white houses of the peasants, forming a landscape so varied that the mind and eye alike are charmed with the skilful union of nature and of art. In the midst of this ideal scene one is carried back in imagination to the period when Paul Veronese, Palladio, and the humbler, though no less gifted, Vittoria, aided by Marc Antonio Barbaro, were completing their united work. Andrea Palladio had drawn out the plans, had guided and inspected all the architectural portion of the work; Alessandro Vittoria had wielded his skilful chisel among the varied ornaments; and Paul Cagliari had beautified the walls with his master hand.

From the extraordinary pleiad of artists which Venice in the sixteenth century contained, Marc Antonio Barbaro and his brother Daniele, the patriarch of Aquileia, — that intensely Roman colony to whose past grandeur the modern town, or rather village, offers as striking a contrast as perhaps exists,—had chosen Paul Veronese, Palladio, and Vittoria to build and decorate for them a villa in the Venetian hills, and the work promised additionally to be a masterpiece of taste and design, for both the patriarch and his brother were fervent patrons of the arts; Daniele had, indeed, translated and commented on Vitruvius, while his brother Marc Antonio possessed no mean plastic powers.

The spot chosen for the erection of their villa by the brothers was on the southern slope of the last range of Venetian hills, the very range of gently undulating eminences on which the old town and castle of Asolo are situated.* It was a lovely spot, with the shallow blue Piave placidly flowing past on its way to the lagoons at no great distance, at the foot of the then well-wooded Montello, and slightly raised above the dead level of the great Trevisan plain. Here more than once the patriarch and his brother must have come to reconnoitre the future situation of their pleasant summer dwelling, in company with Palladio and Paul Veronese, whose handsome dogs gambolled round him, or followed the exciting scent of some frightened hare, disturbed in this then almost untouched solitude.

At length, after all due consideration, the site was settled, for no hasty affair was then the building of a house, and soon Palladio and his band of men were hard at work. Their first care completed,—the cutting in the hill-side (on which the site had been chosen) of a large step, so to speak, the height of the first story,—the house was built on this in such a manner that both stories had one side at least on a level with the ground, the first on the front, the second on the rear.

To the south, the sun darting his genial rays directly on the façade, the warmth and light were concentrated in the autumn days. To the north the shadow of the house was thrown upon the hill-side, protecting it from the sun, and here in the midst of the greenest and freshest grass plays the sparkle of the fountain, refreshing the whole air around. In this ingenious manner warmth was obtained on the cold days, and cool shade for the hotter; and so successfully has this intention been carried out, that while before the house rise, in summer, in all the varied and delicate shades of their green, the oleander, the olive, and the aloe, in the rear of the house prosper more than one retiring and shade-loving plant, and thick moss brightens the trunks of the dark green pines, wandering through which, by the paths winding amidst the overarching trees, one gradually ascends the mountain-slope, at whose summit lie stretched before one the superb panorama of the whole of the Venetian hills and the great plain far below.

* See *Builder*, vol. xxxvi., pp. 1166, 1259; and vol. xxxvii., p. 385.

Nature and art thus agreeably called upon to help each other, Palladio's next duty was the disposition of the interior in accordance with the varied needs of villa life, the apartments for the family, for the guests, for study, and for general gathering; then the arrangements for the out-houses, the kitchen, the pantries, the servants' rooms, the cellars, the granaries, the stables, and the hay-loft. Each was situated by Palladio's care with due regard to the requirements of all. Pure water from the mountain springs was conducted to the kitchen for domestic use, whence it was led partly for purposes of irrigation, partly to the well-stocked fish-pond. The principal building he extended in the form of a cross, so as to obtain a large room from which the whole panorama of mountain and plain scenery could be enjoyed. Externally an Ionic character was given to this; and flanked with two galleries, through which runs a long file of rooms; each gallery is terminated with a pigeon-cote, completing the design and harmonising with the whole, the charming occupants enlivening the scene by fluttering round in clouds or grouping cooing together on the cornices. Nor is the interior less grandiose than the exterior; the cruciform *sala* is lighted with ample windows, to the south overlooking the wide space of the plain, on the north looking on to the towering mountains; and a semicircle in the midst of which rises a Neptune's grotto and a fountain ornamented with various figures and *jets d'eau*, which play upon the flowers and grass around. At the same time as the villa, was erected the temple or church which meets the eye at the entrance, further decorated with fountain and statues, with festoons of flowers and fruit modelled and chiselled by the fantastic hand of Vittoria.

Palladio's work completed, his friend, Paul Veronese, came in to decorate the wall-spaces he had left him for his designs, and there we may imagine the figure of the painter of the "Marriage of Cana," on the simple scaffolding, with masterly decision, placing on the walls those superb colours which infused such life into the inventions of his genius. The magnificence of the Barbaro family, the sumptuousness of their dwelling, the criticisms of Palladio, Vittoria, and Marc Antonio, awoke in him all his best powers, and his facile brush peopled the walls of the villa at Maser with all the mythical personages of poetry, with loves and nymphs, and gods and goddesses, and flying Cupids perched upon the cornices, showering flowers heaped high in their rosy laps; overlooked by graver figures, Nobility, Power, Honour, and Magnificence, emblematical of the family of the Barbaro; Flora, Bacchus, Ceres, and Vertumna, representative of the products of the soil; the elements personified; and the rural arts, alluding to the joyous country life.

In the great *sala* are eight figures in various positions; these Count Algarotti has believed to represent the Muses, while between the columns may be seen, placed there as if by chance, lances and numerous other arms. From half-opened doors peep at one persons who seem alive. On the chimney-pieces, huge as furnaces, are heaped, in painting, various mythological groups; in each room new pictured marvels strike one, of that luxuriant taste which squandered magnificence on everything it touched or used; superb stuffs, scarlet velvets, golden cups, chiselled ewers, vases of perfumes, pearls, gems, flowers, fruits, and leaves adorning the hair, the bosom, and the arms of his lovely painted dames, resplendent in their decorous nudity. The painter loved contrasts, and he employed them with judicious skill, and more than once by the side of muscular heroes, with their rugged features, we see placed the graceful form of some pale goddess. But it was to the painting of the Olympus that he gave especial care, and here has introduced, with all the wealth of colour of which he was so profound a master, the most familiar of the numerous gods and goddesses.

While thus the architect, the decorator, and the sculptor were intent on their several portions of the work, the owner of the house, Marc Antonio Barbaro, was modelling the statues which were to figure in the fountain of Neptune; and when the evening sun set under the dark-blue haze of the horizon, in the direction of Padua and Vicenza, the workers met round the hospitable table of their host, and it is not difficult to imagine how the cultured wit flowed under the excitement of the honest wine of the hills, and more than one sharp Boccaccio-like jest must have waked the laughter of the group.

Many generations have passed away since those friends and professors met, till at length the gorgeous Villa Barbaro fell into the hands of the last Doge of Venice, the unfortunate if not guilty Ludovico Manin. Here this ruler of the already defunct republic enjoyed a few years of happiness; but after his death, the villa fell into hands, alas! unworthy of its possession. The abandoned home fell to pieces, the fountains played no more, the fire in the noble hearths died out. The loves and nymphs and all the gods of Olympus vanished under a thick veil of dust, and the descendants of Arachne, and Mahomet's kind spider friend, spun their magic nets across and over the beautiful cornices and statues; the squalor of neglect threw its curse over the abandoned house, and as the twilight descended, the bats flitted capriciously round the shades of Andrea, Paul and Alessandro, with their patron Marc Antonio, still sitting round the silent table.

But human vicissitudes are obliged to follow the stern laws of nature, and after the long darkness of ignorance broke the day-spring of appreciation. Signor Giacomelli purchased the Villa di Maser, and, making it his home, restored to his country and the world a precious jewel of the art of the new learning.

A new colony of artists met again at Maser; the dust and cobwebs disappeared, the gods of Olympus shone out again in all their glory, and in every part the villa was restored to its original freshness. Angelo Giacomelli, entrusted by his uncle with the supervision of the work, prevented any touch of Paul Veronese's hand from being injured, and the work was simply washed, re-appearing in all its original beauty, though mellowed, as one would say of ordinary pictures, but of frescoes, chastened by the patina of time.

Again the gardens shone with flowers, among which played the old fountains; the hills were planted with new vines, and the orchard resembled its description by Palladio, when it was "full of the most excellent fruits and various shrubs." The doves returned to their nests; again the welcome flame shot up in the old kitchen-fire; new artists sat round the table of the new proprietor in the room hallowed by the memories of their more famous predecessors, to whom they drank more than one toast, rendering homage to the intelligent generosity of those who employ nobly their wealth, restoring to works of genius their antique splendour, and thus causing to re-flourish those fine arts which act so potently in refining the manners of a nation, and in making life agreeable.

Treviso.

EMPLOYERS' LIABILITY AND WORKMEN'S SAFETY.

We have recently been silent on the subject of Employers' Liability. Our silence has been due, not to any undervaluing of the great importance of the question, nor yet to any hesitation as to the counsel we might have been able to offer, but to the fact that the discussion had passed into another arena than that of literature, and that one in which other considerations than those of calm reason were for the time but too likely to be predominant.

Now, however, that the strife of party has, for the moment, been brought, as far as regards legislation on this subject, to a close, and that a new departure is attempted by certain self-styled advocates of the interests of labour, without waiting to test the outcome of the change really effected in the law, silence is no longer needful, nor we think, altogether becoming. If the steady and wide-spread support which is given by so many members of the industrial classes to the *Builder* be a source of satisfaction to us, it imposes on us, at the same time, the weight of a great responsibility. And all the more confident do we feel that the disinterested, and we trust consistent, advice of an old friend will have more permanent weight with our industrial brothers than that of any violent advocate of extreme and one-sided courses.

The point now before us is the attempt made to induce the working-men so to deal with this new position as to make it only a step in a course that is based on the dangerous fallacy that the interest of the owner of live labour is opposed to that of the owner of stored-up labour; or that, in any trade, the interest of the workman is opposed to that of the employer, or should be urged without any regard to the effect it may have on that of the latter. Any counsel or any action based on this dangerous fallacy can only, as far as it has any effect at all, have an effect altogether disastrous.

In the discussions that have so widely taken place as to the mode of adjusting fairly the subject of the liability of the employer in case of injury to his servants, it has not, as far as we are aware, been brought forward with proper clearness that two totally distinct principles are involved in the question. These are, that of penal infliction, and that of compensation for injury. Each demands attention; but when the two are, as has hitherto been the case, jumbled together, it is little to be wondered at that accord between the different parties concerned has been found to be so difficult.

We are not of opinion that penal infliction is altogther an evil. On the contrary, although the cost to an employer of any serious catastrophe in his works is in itself a penalty for want of care, we think that the law cannot be altogether indifferent to the protection of human life and limb, and that its protection should be afforded to the workman, not only in giving him compensation for injury, but in directly punishing neglect. In the same way should that neglect be punished if it be that of the workman himself. Thus in any case of the conduct of large works under inadequate precautions, or with inadequate machinery, as well as in any case of disobedience to precautionary orders, we think penalty should follow. We would punish the owner of a mine who used a rope when it was no longer safe, just as we would punish a miner who unlocked a safety-lamp in a fiery mine. And we should rejoice to see an efficient penalty inflicted in each case, or in any similar case, entirely irrespective of the question whether any serious mischief did or did not ensue from an act of negligence or foolhardihood. And thus far, we think, the law should be penal.

On the other hand, as to the compensation that should be given in any case of injury to the sufferers, the question of penalty must be laid aside. Not, as we before said, absolutely; for it should be settled on its own merits. But as far as the provision of the compensation itself goes, the only question is, How shall it be made most easy, most adequate, most certain, and most just?

It is certain, whatever any one may say to the contrary, that all such compensation must ultimately come from one source,—the profits of the trade. From no other quarter is a penny to be expected, except from the ever-flowing and sometimes much-abused fountain of public charity. But the pension of the wounded, the widow, or the orphan; or the compensation,—whatever be its form,—to the sufferer by an explosion, or collision, or any other casualty, must come out of the profit of the business in which the sufferers are engaged.

This simple fact is overlooked by those who now hastily counsel workmen "not to consent to contract themselves out of liability." Such counsel is surely, in the first place, premature. It would be time to give it, if any proof were at hand that injustice is meditated. Above all, it is narrow and short-sighted, because it looks at only one portion of the question. It is based on that most false of all assumptions, that in any particular trade a certain quantity of work *must* be done, and that the workmen, by declining to work more than a certain time for a certain pay, can fix the price of their work. No view can be more Utopian, more idle, or more false. Insurance, some of the friends of the workman say, will be a tax upon wages. But the rate of wages will not depend on whether they are nominally taxed or not. The net wage,—that which the man will receive clear of all deductions,—will depend on two things, and, in the long run, on these alone. These are, the profit of the trade, and the relation between the labour offered and the labour supplied in order to carry it out. And these two elements must be regarded together, as influencing one another. If we look at one alone, we shall be liable to err. Thus regarded, it is certain, first, that any compensation to the workman must come out of the profits of the trade; and, secondly, that such compensation will be the fullest, and the most readily obtained, when it is charged and divided in the most regular and provident way upon those profits.

We are not now about to suggest in what manner this should be done. It is possible that different expedients may best suit different occupations. But it is to the solution of this important question that the best efforts of the ablest men in the different departments of our

productive industry should now be directed. In these efforts we should like to see the workman take an intelligent part. His hasty counsellors urge him either to take no part at all, or to take an unintelligent part. "Don't put a finger to the wheel," they say; "throw the whole onus on the masters. They are now liable; don't remove the liability from their shoulders." Can anything be more foolish? Can anything more surely tend to the ruin of a trade than the effort to throw as much stress as possible on one portion,—and only one portion,—of the machinery? Is there any difference in the solemn folly of the man who says, "Make capital bear all the risk," and that of the other who says, "Let the labourers look out for themselves?" If a trade has to be carried on at all, it will only be continued so long as it makes a certain profit. No one manufactures for the sake of manufacturing; no one,—for long together,—carries on a business only for the sake of paying so much wages. The moment the profit of a trade declines, the shoe begins to pinch all round. Interest on the capital falls, rate of wages falls; expenses contract themselves in one way or another, until either a living profit is made, or the trade is given up. Out of this living profit casualties have to be paid for. What may be the form in which the payment is made will matter little to the amount in the long run. The more certain be the mode adopted, — the less room for dispute or for litigation,—the better for the workman and the better for all parties.

Let us suppose the case of an exceptionally dangerous business,—say, a year or two hence. Let us imagine one employer who says, "I pay such and such wages, and in any case of accident on my works the men may take legal advice, and I shall do the same. I shall, of course, do my best to resist any claim on me, and I give you fair notice to that effect." Another employer says, "I pay such and such wages, out of which so and so is put by for an insurance fund, to which I contribute so much myself, and in any case of injury compensation will be made out of the fund at rates fixed and published." Can there be any doubt which employer would have the pick of his men? Whether the second would pay nominally higher or lower wages than the first would depend more on the anxiety of men for work than on anything else. The workman would feel certain in the one case, he would be quite at sea in the other. Bearing in mind the item of lawyers' bills, there can be little doubt that the second of the two supposed masters would be able to pay higher wages than the first, and that he would, at the same time, find men ready to come to him at lower wages. For the second business, in the long run, would pay only the ascertained and agreed cost of casualties. The first would have to pay, more or less accurately, for the cost of casualties; it would also have to pay the cost of fighting for the apportionment of the same; and it would be likely to have more casualties for which to pay in consequence of the less harmonious working of all the members of the establishment, as compared with that secured in the other case.

We say, then, to the working men, "Turn a deaf ear to those who, from whatever motives, advise you to meet the new law as to employers' liability in a narrow and antagonistic spirit. See what is proposed, ponder what is best, listen to the promptings of your own good sense and good feeling. But distrust all who would hound you on to an unreasoning and improvident hostility to whatever may be proposed in the common interests of your trade."

Artisans' Institute.—Technical classes for the practical and scientific instruction of apprentices and workmen in various trades, such as carpenters, joiners, bricklayers, masons, modellers, and metal-plate workers, will be opened on Oct. 4th, at 29, Castle-street, St. Martin's-lane. This is the seventh year during which the Institute has been in operation, and the special value of the instruction afforded has received increasing recognition from workmen, employers, and educationists. The City and Guilds of London Institute for Technical Education have given it their special support. Mr. Samuel Morley, M.P., Sir Harcourt Johnstone, M.P., and Mr. Hodgson Pratt are the trustees, the last-named acting as treasurer, with a general supervision over the management. Mr. C. T. Millis is the secretary, and information may be had from him at the Institute.

OLD LESSONS REVIEWED AND NEW LESSONS CONSIDERED.*

Sanitary science may be said to be both old and young. It is so old that we know nothing of its commencement, simply because we know nothing definite of the origin of the human race. The cave inhabitants were skilled in art; but at how distant a period they lived, or in what other respects they were skilled, we have little means of knowing; of this, however, we may be certain, that they would suffer from disease, and would use medicines and enchantments in some form to relieve their suffering.† At whatever period of this earth's history intelligent man appeared, diseases would afflict him; and when remedial measures were invented and applied, then *sanitary science commenced.*

There are problems in natural history which can only be speculative; as, the origin and constitution of matter; the origin of life; the origin of disease. The human intellect is powerless to fathom these profound mysteries, and if revelation is rejected, there can be nothing but a blank impenetrable darkness. There is minuteness below the search of the best microscope, and a range in magnitude very far beyond the combining power of the best telescope. One law alone is clear and certain, namely, the universal law of motion, which is change—combination and disintegration these never cease. That we call life or death pervades the universe; and the life of a system—sun and planets — though extended to millions upon millions of years, is, in the roll of eternity, no more than the life of an emmet, which is born and dies in a summer's day. As old systems perish, new systems replace them, to run their appointed course from birth to maturity, and from maturity to decay. I have neither time nor inclination to attempt to summarise ancient and modern theories as to ultimate atoms, if, or, if not, such exist; as, also, if or not, each atom is sensuous, and that, as a consequence, all bodies have developments of sensuousness in a degree — the combination of atoms in man developing sensuousness in the highest degree; matter combined in living forms other than animal life develops properties very like consciousness, as plants shrink from poisons, and, with apparent avidity, seek wholesome food, in this respect showing an intelligence superior to many forms of animal life. I, individually, should like to believe that plants can think.

But to the purport of this paper,—"Old Lessons in Sanitary Science Revived, and New Lessons Considered." The most reliable starting point I will take may be found in Leviticus xiv., beginning at the thirty-third verse, where the plague of leprosy is described afflicting the house. Without extracting the whole, the sanitary engineer will recognise "the walls with hollow strakes, greenish or reddish, which, in sight, are lower than the wall." Here is vividly described a tainted subsoil, wet and rotten with saturated filth. The modern remedy would be, entire removal of the tainted subsoil, to be replaced by lime concrete, removal of the tainted walls, underpinning with new material, and the introduction of a damp-proof course. Leprosy (or the equivalent of leprosy) affects houses at this day in all parts of the world inhabited by man, from European palaces to the hut of the Esquimaux.‡ In this malarrangement the savage fares better than the civilised man, as nomad tribes can leave a tainted site, whilst dwellers in villages, towns, and cities remain fixed on sites filth-tainted to supersaturation. Seeds of disease ripen in the polluted huts and houses of India, China, and Europe, and the North American cities have not escaped this general contamination. Australia and New Zealand have already polluted the sites of their cities to a dangerous extent, so that the mortality returns are no better than those of the old country.

In England we have apparently banished plague, which, however, prevails in the East,—Russia, Egypt, and the cities of Asia; but England has ripened the "*germs*" of cholera very recently, and typhus, typhoid, and other forms of fever commonly prevail. That these diseases can be prevented our model prisons bear witness, and modern sanitary works have also materially improved entire town communities. I have used the word "*germ*" as applicable to disease, without in the least being enabled to explain satisfactorily what is meant by it. That types of disease can be introduced and spread will be readily admitted; but that the origin, in each case, is a *germ* is not so easy of proof. It has been suggested that cholera must be conveyed to the human system in water; as, also, that tainted water and tainted milk produce typhus and scarlet fevers; and some say that fluids are necessary to the introduction of those forms of disease into the human system, periods of time being fixed for incubation. There are, however, some facts against this theory being received in its entirety; as, for instance, troops and travellers on the march into a virgin country previously unoccupied by man, develop these forms of disease much beyond the assigned period of incubation, and which, under the surrounding conditions, cannot be due to mantainted earth, air, or water; so that the germ theory fails, unless we can imagine that germs of every form of disease which can afflict men or animals are as eternal as matter, and are dormant in matter until conditions for development are brought about. According to this idea, soil, water, and air, and every human body, must contain germs of every disease, but dormant, until brought into contact with conditions favourable for development.

The cleanest-looking places are not necessarily the safest. A clean looking country house or village, surrounded by pure air free from coal smoke, may have hidden dangers worse than any in a town. Visible dirt is not always the most dangerous, as the rain washes it, the wind blows over it, and the sun dries it. The presence of rats, either in country or in town, is a certain indication of danger, as rats live on garbage. They are usually diseased, and can convey the seeds of disease. It is not possible to predict, in all cases, as to what shall cause disease in excess in any given locality, as filth under peculiar and unknown modifications, or plus an unknown factor, may be sufficient to cause typhoid, without the so-called specific germ from a previous case. A telluric influence or an atmospheric influence, which we can neither control nor analyse, in combination with great elemental disturbances, may produce disease in excess. . . . . .

Past history has, for the most part, consisted of details of the birth, life, and death of kings, of their wars and conquests, with a very slight glimpse of the state of the people. In the future, true history will note and record the condition and doings of the people, as constituting the power of the state; but at present the world is very far from this condition. When in this age of general improvement in arts, manufactures, and commerce, we find Europe in arms to a greater extent than at any former period, and the people under a load of expenditure the heaviest in the world's history, thoughtful men must pause, wonder, and look for some practicable solution. The taxes now being levied and expended on soldiers, armaments, arms, and ammunition, would more than serve to abolish every city slum and wretched town tenement, admit of the re-arrangement of every city sewer, and pave every street, drain every house, provide a full supply of pure water at high pressure and constant service, and pay for daily scavenging. When history can detail these things as accomplished facts, it will be worth reading. Sanitary science is new, but it is not, as yet, popular. To remove filth, to promote health, and to prolong life, gain little of a statesman's notice in the battle of politics; the work has, however, commenced, and is being taken up, both at home and in our dependencies. The Americans are also becoming earnest sanitarians.

There are poverty, vice, and crime in Great Britain which, when contemplated in detail, are quite appalling; and these are the outcome of defective statesmanship,—and this after years of political freedom and so-called enlightened government. We sanitarians, however, hold that statesmanship which leaves the largest numerical mass of the population in hopeless misery must be defective. This condition of society is not a sound one; and, consequently, is not a safe one. To see the results of despotism and neglect in their most aggravated forms, we must, however, cast our mental vision over the empires of China and Russia, where millions of men know nothing of political and civil freedom,

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* From a paper by Mr. Robert Rawlinson, C.B., read at the Exeter Congress of the Sanitary Institute.

† There are dwellers in caves at this day in parts of Great Britain and Ireland, as, also, in other parts of the world,—probably as many as ever in any age occupied such places for residence.

‡ It may not be strictly proper to use the word "leprosy" as being common to houses; the meaning is, that houses are filth-tainted to an extent which causes rotten: ess capable of producing disease.

the results being civil commotions, rebellions and civil slaughter, wholesale arrests, wholesale condemnations, wholesale transportations, and wholesale decapitations, which effect nothing worth the trouble. Because the wretched people have no cessation to their persecution, they exist in misery, and have no hope.

True sanitary science recognises the unit, man,—looks at the individual, the single family, the single house, the village, the town, and the city, as these constitute nations, and as are the individuals, so must be family, town, and nation. If, therefore, there is ignorance, wretchedness, and vice amongst the lower orders of the people, the leaven pervades the entire nation.

These questions may be termed political, and it may be said that sanitarians have nothing to do with politics. Our reply, if questioned as to this, must be that to govern men is the prime duty of a statesman. But what are the definitions of the word "govern"? To a despot there is only one definition, and that is, repression; which implies every form of cruelty which man ever devised and practised. To a British statesman I hope it means to care for the whole people, to educate and protect them in all honest dealings, to repeal all laws which tend to the commission of crime, to abolish class legislation, and to know nothing of party if it leads to faction.

The domestic side of sanitary science deals with home comforts, and the unit in this case is the house, then the village and the town. Houses must be planned, constructed, and regulated to afford means of health and morality to the occupants. Villages and towns must be so arranged, built, sewered, paved, and scavenged, as to preserve the purity of the soil below and the air above for the benefit of the inhabitants. To secure such ends there must be sewers, drains, pavements, scavenging, and a water supply. Sewering is ancient beyond written records; sewering scientifically is, however, modern, very modern, as some of those who presided at the birth of the modern system of town sewering are happily now living. Edwin Chadwick, C.B., though not a civil engineer, has, through the aid of engineers, done more to found and promote the true principles of town sewering than any other single individual in this generation.

There were sewers and drains in the cities of Asia which are now heaps of ruins. As in these days, so then, where large areas were covered with buildings, and men were aggregated, there would be sewage; and this would be removed by open channels and covered conduits, necessity having been the mother of invention. These ancient cities were, however, not wholly sewered, but only partially. It is very easy to be positive on this point, namely, that sewers and drains were not general, as there are no remains beneath great areas covered by the common people, and the ruins of which would have been found if sewer and drain-pipes had ever been laid.

Rome sewered and drained her cities, public buildings, baths, and palaces from a very early period of her history, and the ruins are there to this day. Pliny describes sewers in some of his letters to the Emperor Trajan. There were not only sewers, but there was also river pollution. The great cloaca sewer of Rome emptied sewage into the Tiber; and Pliny directs the attention of the emperor to a case in a provincial city, where certain banished men resided, apparently living in ease and idleness. There were sewers in the district, and a polluted stream flowed through it, which had become a great nuisance, and was complained of by the inhabitants. Pliny, in this case, suggests that the idle, easy-living, banished men should be more fittingly punished by being made to cleanse the foul sewers, and for the future prevent river pollution. Trajan at once consents to so reasonable a proposition. These letters by Pliny are most interesting in showing how actively he performed his duties, and how minutely informed he kept the great Emperor.

At Sinope, on the Black Sea, money had been advanced to the municipality for a theatre. A bad site was, however, chosen,—a swamp,—and the building became a ruin before completion, and the money was wasted. Subsequently, a memorial was sent to Rome petitioning for money to construct waterworks. Pliny, in this case, cautions the emperor, and advises that, if the request is entertained favourably, an engineer be sent with the money, that the local authorities may not job it away, as in the case of the ruined theatre. I suppose the emperor did send an engineer, as, in 1855, I saw the ruins of the service reservoirs, which, but for man's destruction, would have been as entire as on the day of their completion, the walls now remaining being sound and massive as when first constructed.

The making of earthenware vessels by means of the potters' wheel is of very ancient date; and the work of the potter has, amidst all the ruins of ancient cities, been the most enduring. The vast collection of bricks, tiles, tablets, pipes, and vases placed in European museums testify to this fact. At some early period earthenware pipes were thrown on the potter's wheel, having sockets for jointing similar to those now made in England. I saw samples in Asia Minor, in 1855, evidently new. They were about 13 in. in length, and 5 in. internal diameter, having a socket of about 1½ in. in depth. They were being laid at Kulali, situate on the Bosphorus, to form a conduit to bring water to the barrack hospital. The natives were at work laying the pipes on a contour line, a considerable length of trench being open. I did not at first see any arrangements for ventilation and wash-outs, and was questioning the engineer officer upon these points, as to whether or not they had been provided for, and making a rough diagram, scratching on the ground with a stick to illustrate my questions. The engineer officer could give no information; but one of the native workmen, who had been listening to and watching us, touched me on the shoulder, and, with a sparkling countenance, said "*bono-bono*," immediately taking me along the line of aqueduct, and pointed out the structural means I inquired about, both for ventilation and for wash-out.

Aqueduct making is a very old Eastern practice, aqueducts, fountains, and wells being common all over the inhabited parts of Asia. Water, as one of the elements necessary to life, was, in a warm climate, sought for and stored carefully. A very meagre history of springs and wells would form a large book, and might be as interesting as the most vivid romance. There are holy wells throughout Asia, and there are also holy wells and fairy wells in Europe, novelists having with great effect availed themselves of these superstitions, and woven them into their descriptions of supernatural phenomena. There is, in fact, an enormous amount of superstition, romance, and poetry connected with springs. Magical virtues are attributed to many waters, a belief in which leads to incalculable injury.

There are shrines in India within which are reputedly sacred waters, to be washed with, and to be drunk by the pilgrims to secure eternal salvation. On certain days in the year thousands of the natives assemble and encamp round these sacred shrines. The approach to the holy water is by a flight of marble steps, down which perspiring natives, many of whom are crippled and diseased, throng to have a cupful of the fluid. The practice is to pour a cupful over the head of each native, to flow back to the tank, and this hundreds of times repeated during the day, so that it ceases to be water and becomes a vile compound,—the washings from the bodies and feet of natives, and this horrible decoction the priests in attendance administer to be drunk by the poor besotted votaries. Cholera usually breaks out amongst the pilgrims at these gatherings, and it would be contrary to the known laws of sanitary science if it did not do so.

Recently there has very properly been a rage for water analyses, many thousands having been made in Great Britain and in British India, and very startling conditions have been revealed. Water which has been considered pure by the inhabitants of English towns has been found to contain a dangerous proportion of polluting matter, to the effects of which they appear to be stupidly apathetic; but the researches in India reveal a state of things almost too terrible to contemplate. The natives of India are expert diggers of wells and formers of tanks to supply and store water for use; they are also careless of life, committing suicide with apparent avidity, death by drowning being common. It had been observed that at certain Indian stations British soldiers were liable to be afflicted with virulent types of disease,—as cholera, fevers, and, at Delhi, carbuncles and sores, the Delhi sores having become a recognised affliction. Inspection was ordered, when it was found that within the province there had been about 1,700 carcasses of human beings removed from tanks and wells, the water from which had been regularly used for human consumption. Some of the worst wells were ordered to be cleansed, when many human bones were removed from them. The tanks in use are open, and the surrounding ground slopes towards the water; over the surface human excrement is spread, and the natives both wash clothes and bathe in the water they use for cooking and drinking. High caste apparently affords no protection, but acts in a contrary direction. Calcutta is supplied with filtered water, but high-caste natives decline to use it. A native water-carrier was observed filling his skin at a stand-pipe with filtered water, but when about three-parts filled, he went to the nearest puddle, and with his hands proceeded to fill his vessel. An Englishman, observing him, asked what he was doing, when he replied, "Making Ganges water for master." *

Some medical men state that pure water is absolutely necessary to health; others send their patients to drink the most abominable compounds at English and foreign spas. Pure water is a rarity in nature, and where it is found it must be protected with great care, as it is a powerful solvent and greedy of impurities. The solvent property of rain-water, which is the nearest approach in nature to pure water, is probably amongst all the elements the most powerful agent in moulding and disintegrating the solid earth. By way of illustration, the river Thames may be taken. The water of this river contains, in round numbers, about one ton of bicarbonate of lime in each million of gallons, when the water is clear, bright, and sparkingly transparent. The daily supply pumped into London is now about 135,000,000 of gallons, so that 135 tons of bicarbonate of lime is combined with the supply of each day's water, or upwards of 49,000 tons per annum. The average flow of water down the Thames may be taken as 1,000,000,000 gallons per day; so that about 365,000 tons of bicarbonate of lime is washed down per annum from the Thames alone. About four-fifths of the dry land of the earth contain lime, or are limestone, upon which this dissolving action of rain-water is unceasing; so that the whole of the solid earth above sea-level may be silently washed and wasted down into the great salt ocean. Soft water being so powerful a solvent, is economical for washing, but it is vapid for drinking, and it is liable to produce diarrhœa when peat-tainted. It has not been proven that hard water (hard as Thames water) is injurious to health: it has, however, been demonstrated that it is a great protection to health when it has to be brought into contact with metals,—lead, zinc, and some other substances. It is the duty of the sanitarian to obtain clean water, and to preserve it fresh, cool, and clean; but pure water,—in the full sense of the word "pure,"—I do not believe to be necessary to health,—as spring, stream, river, and well waters necessarily contain salts of the rocks they come into contact with, and these are the waters which are the most largely obtained in nature, and in by far the most cases can alone be obtained, and must, therefore, be accepted. Contaminated water must be dangerous, and should always be avoided. Contamination is not, however, the most dangerous when the water is most visibly polluted. The turbid waters of the Nile, in Egypt, and of the Ganges, in India, are taken for use in preference to all other water. These mighty rivers are, however, usually turbid, the suspended silt acting as a disinfectant.

The filthiest and most dangerous water to drink is well-water, human excreta tainted, which water may be clear and sparkling. Surface-water flowing down brooks and rivers, though visibly polluted, does not appear to be as injurious as tainted well-water, earth and air being purifiers of surface-water. Water, when inclosed and stagnant, as in wells, pipes, or small unventilated tanks, and especially when affected by liquid or gaseous impurities, becomes stinking and unwholesome. In water-works the water to be impounded in reservoirs should be gathered from the cleanest possible sources, and should be preserved clean. Sand-filters should be close to the service-reservoirs, which should be covered and fully ventilated. The supply from the reservoir and the supply-mains should be direct, and the mains should be so laid and connected as to produce continuous circulation, as water retained a long time dormant in "dead-ends" rapidly becomes deteriorated. The best water-supply will be one which secures the

* Great improvements have been made at stations throughout British India in improving and in guiding water-supply sources, both tanks and wells, to prevent pollution; these improvement works are now going on.

purest source, and by the works of storage and distribution preserves it the purest up to its delivery for use.

Bathing and washing are necessary to health, but there are many towns in Great Britain and Ireland without adequate means for bathing and washing; and, as a consequence, the people do not bathe and are not clean. Baths are common in better-class houses, though by no means as common as they should be. The "tub" is, however, used as a substitute. The poor cannot provide their own baths. These ought, therefore, to be provided for them by the municipal authorities in the best and cheapest form, and in the most convenient positions. With the baths should be wash-houses, where water, soap, and all the apparatus necessary for clean and rapid washing, drying, mangling, and ironing should be made available at the least practicable cost, and if sites are judiciously selected, and there is no extravagance in the construction and management, there need be no loss. But a small rate in aid, if required, will be a saving indirectly in promoting cleanliness, sobriety, and improved health.

A writer I have before quoted remarks that in Japan bath-houses exist in great numbers in the towns, where warm water is provided at a small cost. These baths are for the benefit of the poorer classes, who use them in great numbers; as regularly as evening comes crowds of Japanese men and women go to bathe. There are ranges of box-shelves where the clothes are placed, whilst the individual steps into the bath, emerges from it, well rubs the skin, dresses, and departs clean in person. In Great Britain, at this day, thousands upon thousands of the poor are never washed clean from their birth to their death, unless they go to prison or to the workhouse. There is no bathing accommodation provided. At all schools there should be baths, and complete washing should be a part of education, as those who are accustomed to regular personal washing in youth will not subsequently abandon it.

Sanitary science has, during the last half century, probably made most progress in England; but then this island is a very small spot on the globe; and even England,—free, rich, compact, and educated as it is,—only progresses slowly. It may, however, be interesting to this meeting to learn that there is an Association of Municipal and Sanitary Engineers and Surveyors to the number of 205, and that 197 towns and districts are represented by the members. The extent of work executed might be indicated by the make of earthenware pipes and other sanitary articles, if a reliable return could be obtained. The Messrs. Doulton are making about 1,300 miles of drain-pipes per annum, besides many thousand soil-pans; and this may be about one-tenth of the entire English make of sanitary articles. There is not time in a public address to deliver a closely-reasoned essay, and a popular address is not, I assume, expected to be other than discursive. The following remarks may interest the public, though they may not teach much to the educated engineer.

Sewers and Drains.

There are good and bad sewers and drains, and the public should know some of the reasons why this is so, and then they may refrain from condemning sanitary works in general. Sewers and drains have been formed which are so defective as to be a cause of serious nuisance: they are too large, have wide and flat bottoms, the materials are bad, and the construction worse. It is possible to damage a town by defective works, and so bring discredit on sanitary science. I will attempt to describe how a town ought to be sewered, and how houses ought to be drained, to fully answer the purposes intended. Correct plans and sections are required upon which to lay out the system of sewers and drains to be constructed; the depths of the cellars should be figured on the sites of houses; the relative levels of the streets may be indicated by contours, and on the sections the strata should be shown by colours. A careful engineer will test the strata by boring and trial holes. Full details how to lay out sewers in right lines, both on plan and in gradient, are given in the "Suggestions" published by the Local Government Board.

An engineer should settle at the commencement what duties the sewers will have to fulfil. If the town has manufactories consuming and polluting much water, the question may arise, if or not this polluted water is to be removed by the town sewers; there will also, in some cases, be a question of injurious fluids, such as tan-pit refuse and pickle-waste from brass-founders, lacquer manufacturers, and tin-plate workers; there are also dye waters, and soap-waste from woollen manufactories,—some of these fluids can be treated on the premises to precipitate the solids and disinfect and clarify the fluids, and, consequently, where there is no land available for sewage filtration, the manufacturers may reasonably be called upon to clarify their polluted liquids,—and not pass them in their crude state to the sewers. There are wet and dry subsoils. Sewage will, upon good gradients, flow to any point required by gravity; in other cases there may be a flat area with a wet subsoil, and a swamp for an outlet, or this may be below the river or sea level. In such cases pumping may have to be resorted to, and then it is desirable to reduce sewage to a minimum. The subsoil should have independent drainage, and the sewers and drains should be water-tight, surface water, including rainfall, being otherwise provided for.

To construct water-tight sewers and drains requires the best materials and the most careful workmanship, but these, indeed, are necessary under all conditions. In a wet subsoil land-water should be excluded; in a dry subsoil, the sewage should be prevented from leaking out of the sewers. In the foregoing remarks extreme cases of wet and dry are contemplated. If sewage has to be pumped, and has to be clarified by irrigation, the volume to be dealt with should as near as practicable be a constant quantity. If, however, there is a free outlet by gravity, the sewers may be allowed to partially receive both subsoil and surface water; only, however, to some known and limited extent. It is an advantage to have a wet sewer rather than a dry one. Sewage flows intermittently during portions of each day, when the inhabitants are using most water; if there is no subsoil water, the sewers at intervals may be comparatively dry, admitting of deposit. A steady continuous flow of water through sewers sufficient to maintain a regular current, and not more than a few inches in depth in the main sewers, will be an advantage. Main sewers should ordinarily be laid at a depth sufficient to admit of the deepest cellar being effectively drained, the invert of the branch drain being at the least 1 ft. below the cellar floor, the fall of the house-drain being not less than one in sixty, and entering the main sewers not lower than half its diameter. These remarks are of course general, and cannot in all cases be acted upon, as many towns have low sites which cannot be effectively sewered and drained without special means (air-valves) to prevent cellars being flooded by back-water from the sewers, or by special pumping. House drains, as a rule, should be outside the basements of the houses. But where houses are built in streets, and the kitchens are at the back, the drain must cross the basement, unless back drainage is adopted, when no drain need enter the basement. Much has been written and said both in favour of back-drainage and against it. I have had twenty years' experience of back-drainage, and know nothing but good of it. It has been said that it is an interference with the rights of private property; that the drains will choke, and then there must be trespass to find out the point of failure. My reply is that back-drains may be so laid that nothing but gross usage, amounting to wilful action, can choke them; and even in such a case they will be freed and cleansed without trespass, as manholes and flushing will enable them to be so cleansed. To enable sound sewers and drains to be constructed, the trenching must be true, and the bottom to receive sewer or drain must be absolutely sound and solid. There must be no mistake here, or the work will soon be a nuisance and a ruin. Sewers and drains may become broken-backed; then there will be leaking joints, or saturated subsoil, and a choked sewer or drain will bring discredit upon sewering. If the bottom of a sewer or drain-trench is not sound, it may be made so by cement concrete, and in loose wet quicksandy ground sewers and drains should be covered with concrete. Sewers and drains will work better, and be maintained in better order, if subjected to regular and properly-graduated flushing at short intervals. It is possible to overflush, and so injure the sewers. As much water as will give a velocity of about 6 ft. per second may be admitted; greater force, to give a quicker velocity, will be liable to injure brickwork, and blow or force open pipe joints.

Waterclosets and sinks should be against outer walls; should not have continuous flue-like connexions with the sewers, but have a severed connexion, and means for full external ventilation. Every public building, however large, and every house, however small, should be so drained as to afford no possibility of sewage-gases entering, and they should stand absolutely free from the sewers, though perfectly connected with them; this might be a law without any exception. At present almost every public building and house in London is in direct communication, by the drains, with the sewers, so that sewerage-gases pervade them; there are open sewer ventilators in the streets, which serve to dilute the sewage-gases, and the enormous number of houses perform a similar purpose, and it is this dilution which prevents the full amount of mischief from being experienced; but there is a danger in it, and this ought to be avoided. This is to be done by absolute isolation, and external ventilation above the roofs of the houses. In Leeds, for a population of 320,000, there are upwards of 20,000 openings from the sewers acting as ventilators, which have been in use more than seven years. This is an example other towns may follow with advantage. Perfect sewering requires perfect street-paving and perfect street-cleansing. Scavenging must, in all cases, be a work of the municipality, or other local governing body. Contract work should be avoided. The work of scavenging should be paid by rate, and this rate should be general.

Waterworks should, in all cases, be in the hands of the local governing body. The service should be constant and at high pressure, with fire-service provided for. Water should be laid on to every house and to every tenement; there should be no exception. The service-pipes may be of wrought iron, with screw joints, and all the taps should be "screw-down." If the services are taken within the houses and tenements, and the service is high-pressure and constant, there will not be much wilful wasting of water, and house-taps will not be stolen, as waste of water, when at high pressure, will be very disagreeable within a house. Fix stand-pipes in streets and roads, as is done now, and the waste will continue to be unceasing, because it will not inconvenience any one, as when it is within doors. The poor cannot have a full and fair use of water if it is alone obtainable from external stand-pipes, as this involves carrying and storing within the tenement. It should also be remembered that one gallon of water weighs 10 lb., and that fifty gallons weigh 500 lb., and this will be only ten gallons per head for a family of five persons. The labour required to carry 500 lb. of water each day, or eighty tons per annum, will simply be enormous, and ought not to be expected from the poor tenant. Serve the water within the house, have necessary supervision, and take charge of repairs; the inhabitants will then be properly supplied with water, and cannot easily waste it. Before closing these brief and imperfect remarks I may glance at a few works recently executed, or which are now in progress.

Calcutta has been partially sewered, Bombay is now in course of being sewered, and preparations are in progress for sewering and draining other Indian cities. Sewerage works at Berlin are also in progress, to be completed with sewage irrigation. Dantzig has been completed, with sewage irrigation added; and main sewerage plans are being prepared for other Continental cities. At Warsaw, with a population of 350,000, the estimate for sewers is 600,000*l*. Buda Pesth, population 270,000, main sewering under consideration. St. Petersburg, population 670,000, estimate for sewers 3,000,000*l*., to include pumping and sewage purification. Munich, population 250,000, estimate for sewering, 600,000*l*. Düsseldorf is to be sewered by Messrs. Lindley, of Frankfort. Messrs. Lindley have sewered Frankfort-on-the-Maine, population 125,000, cost 380,000*l*. Out of 6,800 houses, 5,200 have been completely drained, and in the town there are about 22,000 water-closets. At present, the sewage goes into the river Maine, but it is to be intercepted and clarified. The Prussian Government insists on sewage clarification, which, at present, is stopping sewering on the Rhine cities, where it is very much needed The water of the Rhine is, however, used for domestic purposes by the population on its banks, and it ought, therefore, to be preserved free from sewage.

French and Belgian towns remain with cess-

pools; even Paris and Brussels, with their enormous and costly main intercepting sewers, are cities of cesspools, and I do not know of a single well-drained city in Italy. We are met here in this ancient city of Exeter to discuss sanitary science and preventive medicine, engineering and sanitary construction, meteorology and geology—to give information and to receive information on subjects which we consider to be of vital importance to each individual man, to each town, and to each nation; but when we read the current newspaper literature of the day, we seem as men beating the air. Statesmen pay very little attention to our subjects, but starve labour by conscription, impoverish populations by taxation, and, at enormous cost, provide the most refined and terrible weapons for human destruction. We are in the midst of a war *furore*, and sanitary works can have no solid and satisfactory progress under existing conditions. There is over the length and breadth of Europe a rampant military spirit; armies, armaments, ironclads, and 100-ton guns, attract most attention. The people are summoned from far to witness autumn manœuvres conducted by emperors, as if soldiers were the beginning and ending of human progress and civilisation. The Americans appear to be the only sane nation. The governments of the Old World are drunk with military ambition.

WOMAN AS A SANITARY REFORMER.*

Two of the wisest of men, and by necessity, therefore, both of them sanitarians, Solomon and Xenophon, have laid down rules bearing on the duties of women who rejoice in being called wives as well as women. "A good wife," says Solomon, "worketh willingly with her hands." "She is like the merchants' ships, she bringeth food from afar." She is an early riser, and sees that every one has an early breakfast. "She riseth while it is yet night, and giveth meat to her household, and a portion to her maidens." By exercise she strengthens her limbs. "She layeth her hands to the spindle, and her hands hold the distaff." She knows that where there is poverty there can be neither health nor happiness. "She stretcheth out her hands to the poor; yea, she reacheth forth her hand to the needy." She provides against the cold. "She is not afraid of the snow for her household; for all her household are clothed in scarlet." In clothing herself she combines artistic taste with usefulness, as every woman is bound to do. "She maketh herself covering of tapestry; her clothing is silk and purple." "She maketh also fine linen and selleth it." "Strength and honour are her clothing." She combines common sense with gentleness. "She openeth her mouth with wisdom; and in her tongue is the law of kindness." She is watchful and busy. "She looketh well to the ways of her household, and eateth not the bread of idleness." And these, says this wise sanitarian, are her rewards:—"She shall rejoice in time to come." "The heart of her husband doth safely trust in her." And, light of perfected happiness! "Her children rise up and call her blessed." The second of the wise sanitarians, Xenophon, tells his story of the good wife in somewhat different terms and manner, and indeed with difference also of detail. He makes Socrates and Critobulus hold a discussion which comes to this general understanding,—that the ordering of a household is the name of a science, and that the science becomes the order and the increase of the house. Socrates, the master, recounts to his pupil that he once held a communication with a man who, indeed, might be called a good and honest man. He had already seen and studied the works of good carpenters, good joiners, good painters, good sculptors, and had seen how they attained to excellence; and so he desired to find out how those who had repute for goodness and honour attained their excellency. He looked for such a one first amongst those who were handsome, but it would not do; for he found that many who had goodly bodies and fair visages had ungracious souls. Then he bethought him to look for a man who by general sentiment was reckoned upon as good, and at last he found Ischomachus, who was generally, both of man and of woman, of citizen and of stranger, called "the good." Socrates is made to discover Ischomachus sitting in the porch of a temple, and, discussing with him many subjects, asks him how it is he is called a good and honest man. At this Ischomachus laughs. "Why," he replies, "I am called good when you and others speak of me I cannot say. I only know that when I am required to pay money for taxes, priests, or subsidies, they call me Ischomachus; and indeed, Socrates, I do not always bide in my house, for my wife can order well enough whatever is wanted there." "And did you yourself bring your wife to this perfection," asks Socrates, "or did her father and mother teach her?" "As she was but fifteen when I married her," returns Ischomachus, "she had seen very little, heard very little, and spoken very little of the world; and therefore,"—he continues some way further on,—"I questioned, and then instructed her." "Methinks," says Ischomachus, "that the God hath caused nature to show plainly that a woman is born to take heed of all such things as should be done at home, and these are the reasons for the belief. He, the Maker, hath made man of body, heart and stomach, strong and mighty to suffer and endure heat and cold, or privation, to journey, and to go to the wars. Wherefore, He hath, in a manner, charged and commanded him with those things that be done abroad, and not of the house. He, also, remembering that He has ordained the woman to bring up young children, has made her far more tender in love towards her children than the man. And, whereas He has ordained that the woman should keep those things which the man getteth and bringeth home to her, and knowing also that to keep a thing safely it is not the worst point to be doubtful and fearful, He has dealt to her a great deal more fear than He did to man; while to man, who must defend himself and his own, He has dealt out more boldness. But because it behoveth that both men and women should alike give and receive, He has bestowed on them alike remembrance and diligence, so that it is hard to discern which of them has most of those qualities. He has, moreover, granted them indifferently, the power to refrain from doing that which is wrong, so that whatever either of them does better than the other is best for both; and because the natures and dispositions of them both are not equally perfect in all these things, they have so much the more need the one of the other; for that that the one lacketh the other hath. Likewise the law shows, and the God commands, that it is best for both to do their part. It is more correct for a woman to keep house than to walk abroad: and it is more shame for a man to remain skulking at home than to apply his mind to such things as must be done abroad." Some lessons of economy are first to hand. The wife is to beware that that which should be spent in a twelvemonth be not spent in a month. The wool that is to be brought in is to be carded and spun, that cloth be made of it; and the corn that is brought in must be most carefully examined, that none which is musty and dirty be eaten as food. Above all, the same instruction that Solomon insists on is enforced with special fervour. The wife is to be most particular, if any of the servants fall sick, that she endeavour herself to do the best she can, not only to cherish them, but also to help that they may have their health restored to them. A little further on the Philosopher touches on the importance of perfect order in the house as connected with the health and wealth of it. From these lessons he teaches his wife, and thereby all wives, matters that are more particularly of a sanitary kind. A house, he says, has an ordination. It is not ordained to be gorgeously painted with divers fair pictures, though these may be excellent, but it is built for this purpose and consideration that it should be profitable and adaptable for those things that are in it, so that, as it were, it bids the owners to lay up everything that is in it in such place as is most meet for the things to be put. Therewith he disposeth of places for things in due form, and assigns the uses of the various parts of the establishment, in such manner that the woman who presides over the whole shall know the parts in a truly scientific way. The inner chamber or room, because it stands strongest of all, is to be the strong room in which the jewels, plate, and every precious thing in the belongings of the house must be securely located. The driest places are to be places for wheat; the highest places for such works and things as require light. The parlours and dining-places, well trimmed and dressed, are to be cool in summer and in winter warm. The situation of the house is to be towards the south, so that in winter the sun's light may fall favourably upon it, and in summer it may be in goodly shadow. The wearing apparel is to be divided into that intended for daily use, and that required for special or grand occasions. Everything belonging to separate service,—to the kitchen, the bakehouse, the bath-room,—is to be assigned to its own place and use. All instruments which the servants use daily are to be shown to the servants in their right places, and are to be kept there when they are not wanted. Such things as should not be made use of except on holydays and rare occasions are to be left in special charge of an upper servant, who should be instructed beyond the rest of the servants to observe the same rules as the mistress herself would carry out. "At last, good Socrates," said Ischomachus, "I did express to my wife that all these rules availed nothing unless she took diligent heed that everything might remain in perfect order. I taught her how in commonwealths, and in cities that were well ruled and ordered, it was not enough for the dwellers and citizens there to have good laws made for them, unless they chose men to have the oversight of those laws. In like manner, then, the woman should be, as it were, the overseer of the laws of the house as the Senate and the Council of Athens oversee and make proof of the men of arms." Finally, Ischomachus touches on the mode by which his wife should maintain her own health. He observed about her, as a very strange habit, that upon a time she had painted her face with a certain unguent that she might seem whiter than she was; and with another unguent that she might seem redder than she was; and that she had a pair of high shoes on her feet to make her seem taller than she was. Whereupon, "Tell me, good wife," said he, "whether you would judge me worthier or more beloved if I explained to you what we are precisely worth, keeping nothing secret from you, or if I deceived you by declaring I had more than I really had, showing you false money, chains of brass instead of gold, counterfeit precious stones, red instead of scarlet, and false purple instead of pure and good?" She replies, "The gods forbid that you should be such a one." He then recalled to her her own deceptions, and when she inquired how she should be fairer in reality, and not appear so only, he gave her as counsel, that she should not sit still like a slave or a bondwoman, but go about the house like a mistress, and see how the works of the house go forward; look after all the workers and sometimes work with her own hands, by which exercise she would have a better appetite for food, better health, and better favoured colour of her face. While likewise the sight of the mistress, more cleanlily and far better apparelled, setting her hand to work, and, as it were, striving at times with her servants who should do most, would be a great comfort to them by leading them to do their work with a good will instead of doing it against their will. For they that always stand still like queens in their majesty will be only judged of by those women who are triumphantly arrayed. "And, now, good Socrates," continued Ischomachus, in conclusion, "be you sure that my wife lives even as I have taught her, and as I have told to you." Good wives of the type of the wife of Ischomachus would, in one decade, make domestic sanitation the useful fashion and order of the nation they purified, beautified, and beatified. I quote this basis of wifely work and duty, because I feel more deeply, day by day, that until it is admitted, and something more built upon it, sanitary progress is a mere conceit, a word and a theory, instead of a thing and a practice. It is in those million centres we call the home that sanitary science must have its true birth. It is from those centres that the river of health must rise. We men may hold our congresses year after year, decade after decade; we may establish our schools; we may whip on our law-givers to action of certain kinds; we may be ever so earnest, ever so persistent, ever so clever; but we shall never move a step in a profitable direction until we carry the women with us heart and soul. Adam had no paradise in Paradise itself until Eve became the helpmeet for him. We ought not to blame woman-kind because it seems that women are behindhand in the work. They are not, in point of fact, behindhand at all; they are rather the forerunners in the race. Long before the word "sanitation" was heard of, or any other word that conveyed the idea of a science of health, the good, cleanly, thrifty housewife

* By Dr. B. W. Richardson. A lecture delivered in the Victoria Hall during the Exeter Congress of the Sanitary Institute.

was a practical sanitary reformer. Nay, if we come to the question of organisation itself, we have in this country, in that admirable Institution, the Ladies' Sanitary Association, the first of the great sanitary societies, which by its publications, its practical aid to mothers, its out-door recreative parties to the stived-up children of the metropolis, and by various other means, has set an example which will one day be historical as a part of the great movement in the promotion of which we are engaged. There is not, therefore, one single difficulty in the way of making the woman the active domestic health reformer. The only thing that requires to be put forward is the method of bringing her universally into the work, and, if I may so express it, making the work a permanent custom or fashion, to neglect which would be considered a moral defect. There are in England and Wales alone six millions to be influenced. The first suggestion is that the beginning of the crusade shall be a beginning that shall not drive, but lead; that shall not dictate, but patiently suggest.

"Women should ne'er be taught a thing unknown,
It should be credited as all their own."

Nor can any finer or nobler occupation be imagined than is implied under this head of domestic care and nourishment of health. There are women who think it the height of human ambition to be considered curers of human maladies, content at best to take their place with the rank-and-file of the army of medicine, and not perceiving that the only feature in their career is its singularity,—a feature that would itself become lost if the wish of the few became the will of the many. I press this office for the prevention of disease on womankind, not simply because they can carry it out; not simply because it pertains to what Xenophon describes as their special attributes, their watchfulness, and their love; but because it is an office which man never can carry out; and because the whole work of prevention waits and waits until the woman takes it up and makes it hers. The man is abroad, the disease threatens the home, and the woman is at the threatened spot. Who is to stop it at the door, the man or the woman? The house is her citadel. The majority of women will ask by what process of training can we help towards a triumph of science so beneficent? I devote myself from this point of my discourse to give some answer to that question.*

THE ROADWAY OF THE THAMES EMBANKMENT, AND THE NEW CITY OF LONDON SCHOOLS.

Simultaneously with the commencement of the works on the site of the intended new City of London Schools, on the Thames Embankment, the Metropolitan Board of Works are at present constructing the additional width of roadway which is to be thrown into the Embankment for some distance westward of the Royal Hotel. The roadway will be widened to the extent of about 20 ft. at the western boundary of the hotel, gradually tapering along the Embankment to the extent of about 180 ft., until the curve, at that distance, works itself out into the present footway of the Embankment. The widened roadway is being formed on the strip of land adjoining the Embankment, immediately in front of what will be the boundary-wall of the new school grounds. It will rest on a series of piers and walls, or arches, erected upon the walls and arches of the Metropolitan District Railway, which runs immediately under it about as far as the hotel, as the railway is carried under and across New Bridge-street, Blackfriars. There will be twelve of these piers and vaults, besides a number of wider openings near the hotel, of a special construction. Several of the piers have already been erected, and the roadway will shortly be completed, and the new wall dividing it from the grounds of the City of London Schools built, but it is not expected to be opened for public traffic until the long-standing dispute between Mr. De Keyser and the Corporation has been settled, and the unsightly hoarding in front of the hotel removed. The roadway is being constructed by Mr. Webster, under the superintendence of Mr. Rowell, as clerk of the works.

Messrs. Hill & Higgs, the contractors for the foundations of the City of London Schools, are actively proceeding with this preliminary portion of the works. The greater portion of the excavations at the west side of the site have already been got out, and a considerable area of the concrete foundations has been laid. Several hundred cubic yards of earth work have been removed, and shipped away in barges from the wharf immediately under Blackfriars Bridge, the tramway under the Embankment, between the old gasworks and the banks of the river, having been utilised for the purpose; it is likewise used for conveying the concrete materials to the site.

* The conclusion in our next.

THE BEDFORDBURY AND GREAT WILD-STREET IMPROVEMENTS.

NEW PEABODY BUILDINGS.

A large portion of the two areas lately cleared in the neighbourhoods of Bedfordbury and Drury-lane, and known as the Bedfordbury and Great Wild-street improvement schemes, will shortly be covered with new blocks of industrial dwellings, erected by the Peabody trustees, who have taken possession of the land and are now proceeding with the buildings. The making of the new and widened street in Bedfordbury, between Chandos-street and New-street, has for some time been in progress, and is now nearly completed, the greater portion of the paving and curbing having been laid. The sewerage of the street was one of the heaviest portions of the work. The thoroughfare is now nearly double its former width, the carriage-way, exclusive of the foot-paths, being 30 ft. wide. We understand that upon the site, which until recently was occupied by narrow confined alleys and repulsive hovels, of which we gave particulars long ago, there will be four blocks of industrial dwellings extending the greater part of the distance between Chandos-street and New-street, nearly the whole of the east side of Bedfordbury being occupied by the west walls of the several blocks, one of which is already in an advanced state. Messrs. Cubitt & Co. are the contractors. Similar blocks of buildings are likewise in course of erection on the extensive area lying between Drury-lane and Great Wild-street, where such a large number of old and dilapidated dwellings were some time ago demolished. The buildings will extend from east to west between Great Wild-street and Drury-lane, and the foundations of the several blocks are now being got in. When completed the buildings on the two sites will contain a very large number of tenements, having accommodation, it is stated, for a population of more than 3,000 persons.

NEW PANORAMA BUILDINGS IN LEICESTER-SQUARE.

A large circular building is at present in course of erection at the rear of the north side of Leicester-square, a site long unoccupied, immediately opposite the gardens, and between Leicester-street and Leicester-place, which is intended for panoramic purposes. It is designated the "Royal Panorama," and will shortly be opened for exhibitions of this character. The architect of the building is M. L. Dumoulin, of Paris, Messrs. Cubitt & Co. being the contractors. The building is covered in, and nearly ready for occupation. It is lighted from the top of the dome. The principal entrance will be along a wide corridor, approached from the Square.

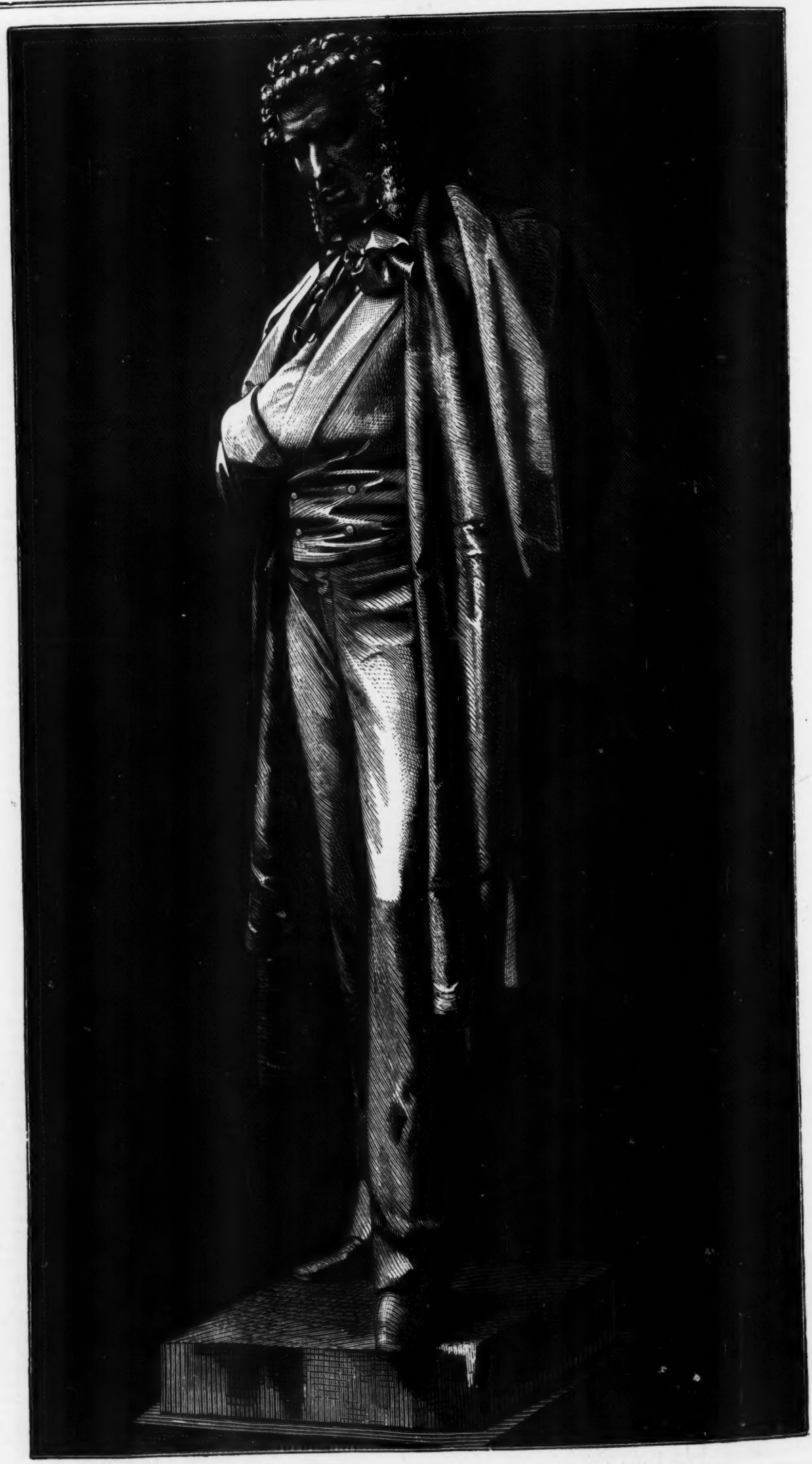
THE BUILDING TRADE IN GLASGOW.

The statistics which Lord Dean of Guild Mirrlees, of Glasgow, gave in his annual statement last week present a fair idea of the poverty of the building trade in the commercial metropolis in Scotland during the past three years. The trade had had a long spell of prosperity, which was not in any sense diminished by the passing of the School Board Act. But too much prosperity is often a bad thing, and so it proved in the building trades. The success of one man put another on the *qui vive;* and in a very short time a building mania commenced in Glasgow, and lasted for several years. Even Edinburgh people, who have no reputation for money-making qualities, joined in the speculation, and helped the builders of the West on to temporary ruin. Glasgow got over-built, and one adverse circumstance after another, crowned by the City Bank failure, brought about a complete collapse at the end of 1876 and the beginning of 1877. Rents have fallen, and in some instances undertakings, commenced years ago, are not yet completed. But for a few public buildings, the trade, indeed, has been almost at a standstill, and there is no sign at present of a revival. In every corner of the city there are numerous blocks of empty houses, and in some parts of the suburbs complete rows of shops are untenanted. We get at the facts by consulting the Dean of Guild Court's figures. Mr. Mirrlees makes out that the last was the worst of the three years of depression. Two years ago the estimated value of the buildings for which "linings" were granted was 755,717*l.*; while last year it was 431,970, and this year, 355,430*l.* The average of these three years came to 514,000*l.*, whereas the average of the five years preceding came to 1,612,000*l.* In other words, the entire value of the building operations in Glasgow, during the last three years, did not come up to the average of a single year of the five years preceding that time. These figures have a deep significance, and though Mr. Mirrlees is uncertain as to the cause of the great falling off, there can be no question that speculative building by non-capitalists, backed up as these gentlemen too often were by legal firms, had a great deal to do with the state of chaos into which everything fell. The greatest diminution during the past three years has been in the rearing of shops,—a now too common commodity in Glasgow; and next come houses for the working-classes. We hope for a revival in the building trade as well as other trades, but we are afraid some time must elapse before there can be room for any great impetus. A curious fact is that, about two years ago, more than a half of the debtors in Glasgow prison had been connected with building speculation, and a significant fact was that the great majority were the builders themselves.

THE PUSCHKIN MONUMENT, MOSCOW.

The monument erected in memory of Paschkin, the well-known Russian poet, which was unveiled not long ago before a vast concourse of spectators, is after the model of the Academician Opekuschin. The bronze figure,—the head slightly inclined forward, the features lighted up by a scarcely perceptible smile of sadness which plays round the half-opened lips, the right hand hidden in the breast, while the left holds behind the back a wideawake hat,—stands upon a pedestal of polished red and dark grey granite, rising 18 ft. above the pavement. Besides festoons, which wind round the base, the latter is adorned by a laurel wreath, with a pen, round which a ribbon is twisted. The front of the monument bears but one word, "Puschkin"; the back has the inscription, "Erected 1880." The total cost of the monument is said to have been 83,000 roubles.

The Black-hole of Hammersmith.—Dr. Hardwicke, the coroner, has properly directed the attention of the Fulham District Board to the rider to the verdict of a jury on the body of Matilda Marchant, who had died in Clerkenwell prison after being confined in the cells of Hammersmith Police Court. The rider was to the effect that the Medical Officer of Health for the district should be requested to inspect the cells. Dr. Collier reported that he had complied with the request, and had also inspected the Police Court. He said—"It appears that the woman Marchant was retained in the police cells at a time when some sanitary alterations were being carried out; but I cannot say whether she contracted the fever of which she died at that time. There are only five cells for the reception of all the prisoners taken to the Court. Each cell contains an area of 481 cubic feet, which is not more than sufficient accommodation for two persons, whereas as many as eight prisoners are at times confined in a cell. There is literally no ventilation except a small iron grating over the door, which is quite inadequate for the purpose. With eight persons confined in a cell, there would be only 96 cubic feet of air space for each prisoner. . . . . There is an apartment termed the 'strong room.' It contains an area of 6,655 cubic feet. It is used at times for the reception of as many as 94 prisoners and 60 constables. This gives only 79 cubic feet of air-space to each person. Such an amount of overcrowding is highly prejudicial to health. The Court itself is quite inadequate for the purpose for which it is used."



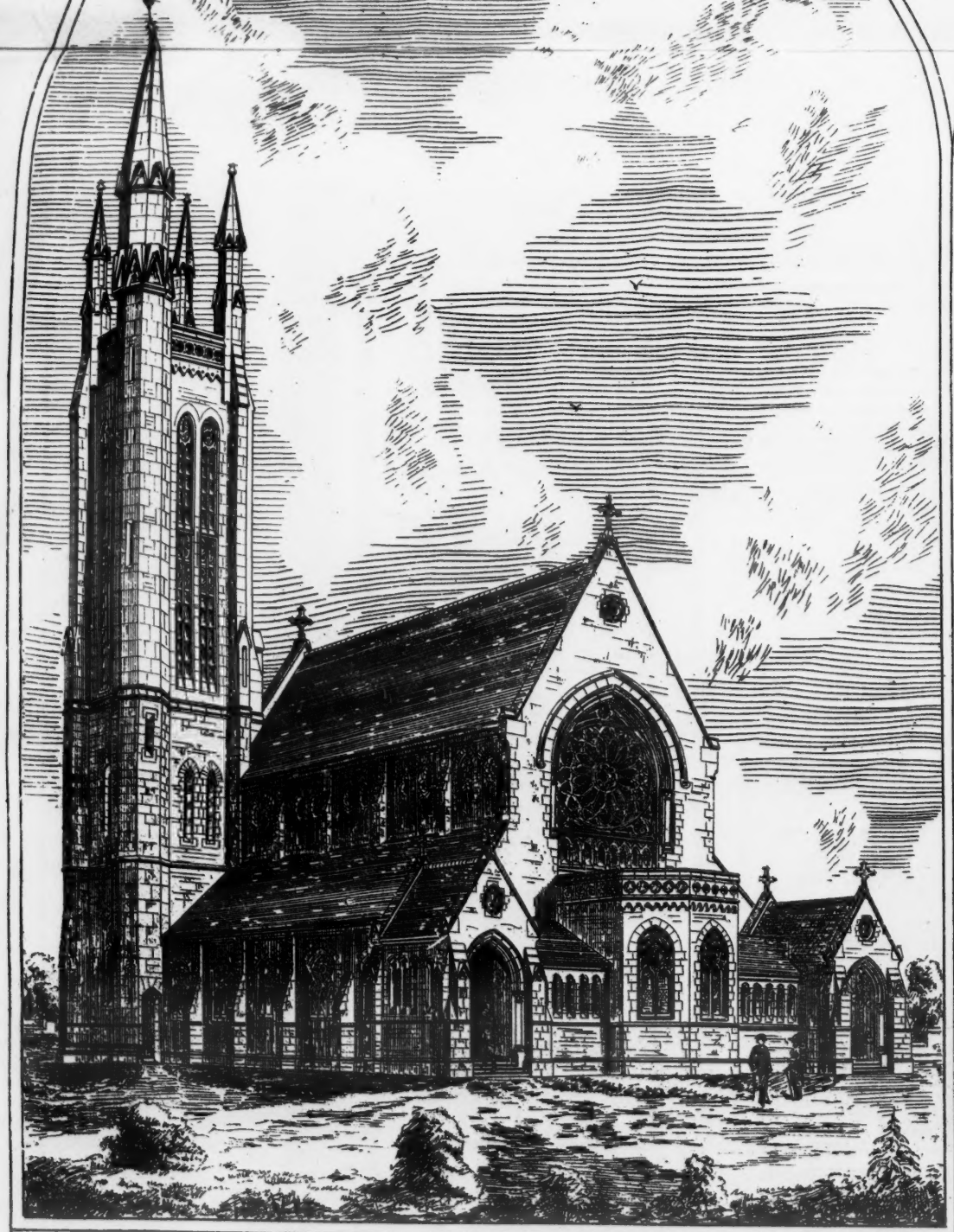
THE PUSCHKIN MONUMENT, MOSCOW.—M. Opekuschin, Sculptor.

Autotype & Bass Photo-Litho

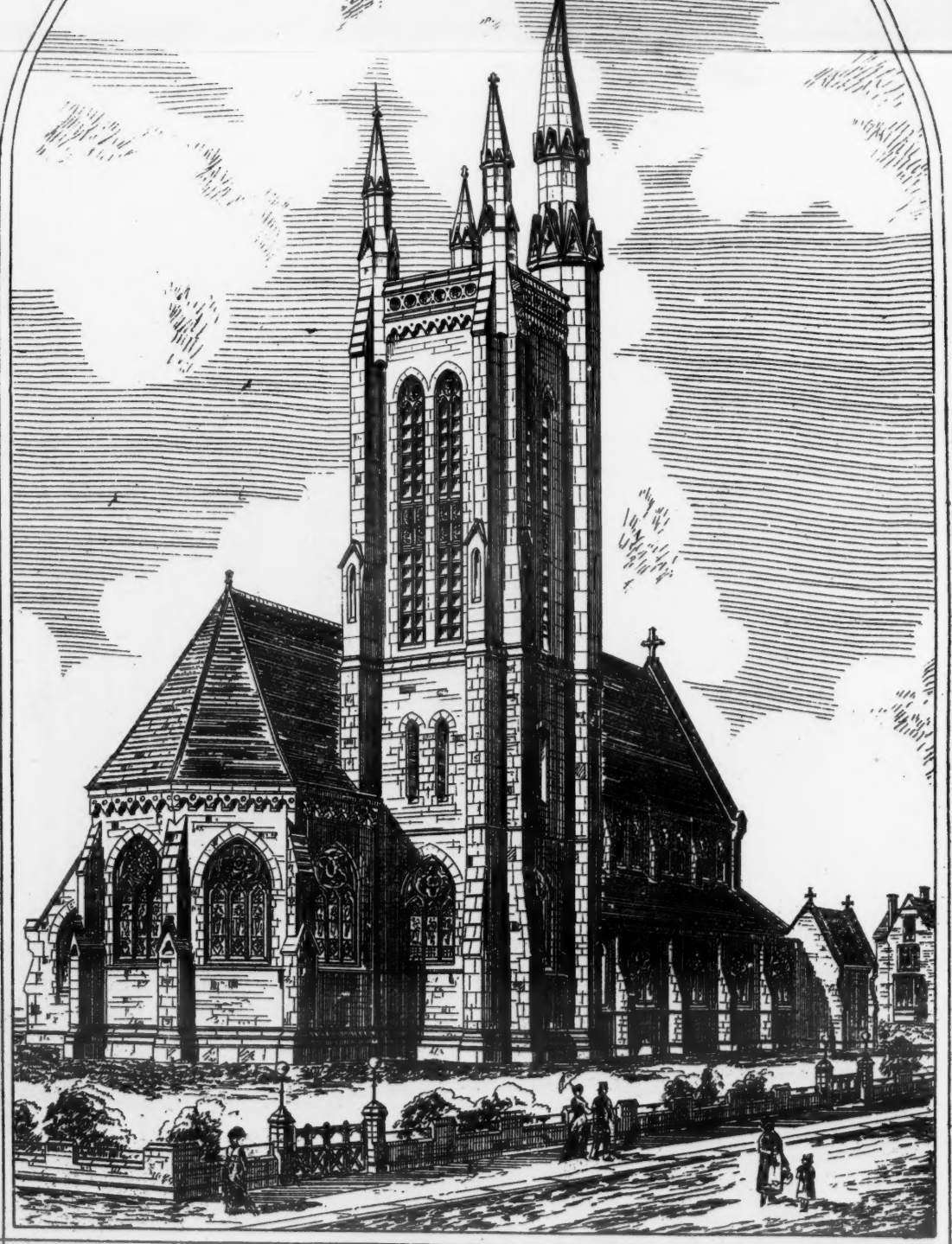
Wyman & Sons, Printers.

ST. GEORGE'S CHURCH, LEWISHAM: INTERIOR VIEW, LOOKING WEST.

CHURCH OF ST. GEORGE
HEADINGLEY
WILLIAM. C. BANKS. ARCHT.

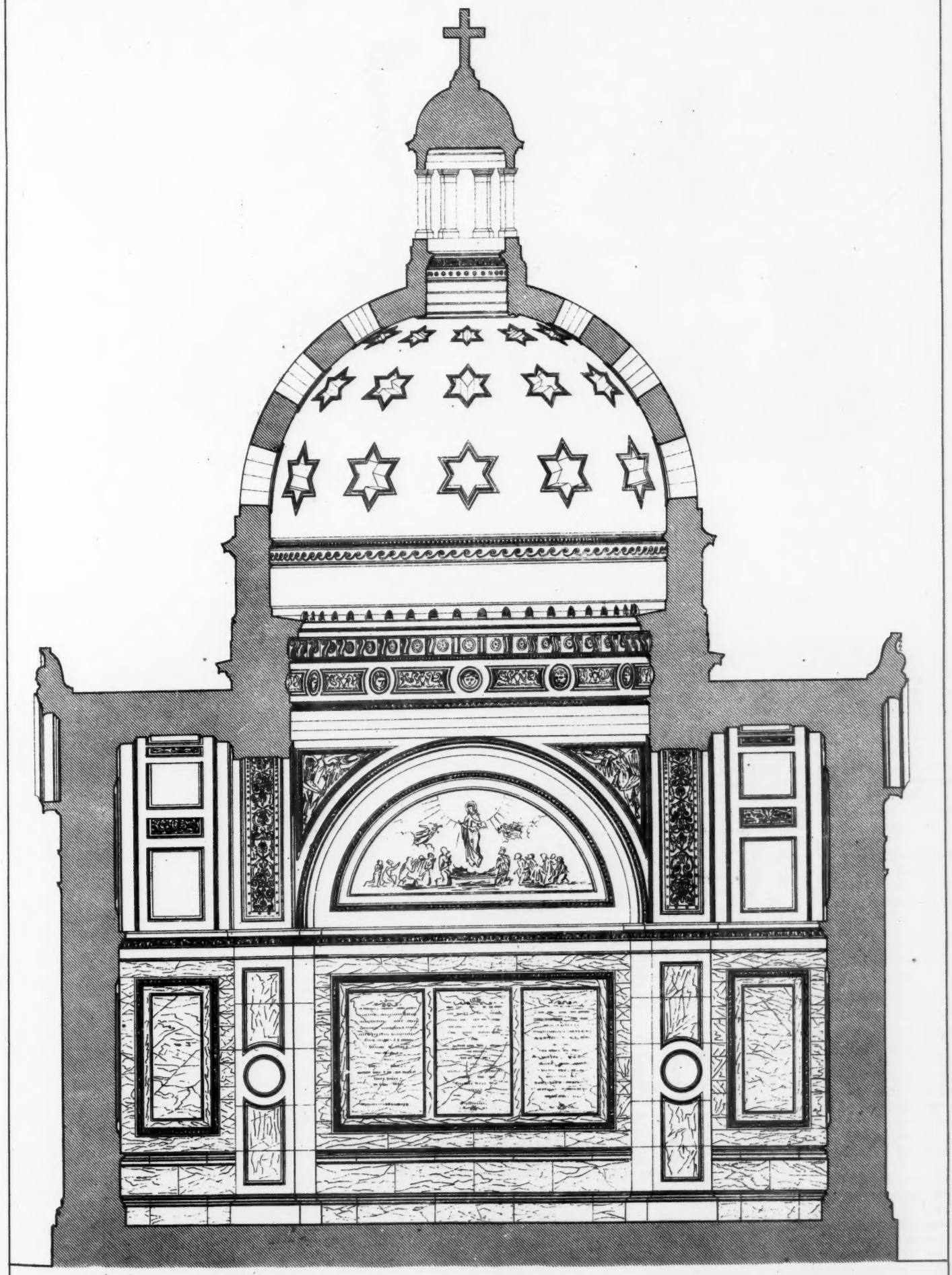


VIEW OF WEST END



VIEW OF EAST END

Wyman & Sons, Printers, 6 Queen St



THE MAUSOLEUM AT WINDLESTONE HALL, DURHAM: SECTION.

MR. J. DICK PEDDIE, ARCHITECT.

Whiteman & Bass *Photo-Litho* 236 High Holborn

Wyman & Sons Printers, 74 Queen St.

ALL SAINTS', HIGHGATE: NEW MISSION HOUSE.

CHURCH OF ST. GEORGE, PERRY-HILL, LEWISHAM, KENT.

This church was consecrated early in the present year, and was erected at the sole cost of the patron, Mr. George Parker, J.P., of Lewisham House. The tower is about to be raised, and the exterior views show it as it will then appear. The cost of this will be defrayed by Mr. Parker, thus making the total outlay about 9,000*l*. The church consists of a nave 85 ft. in length, with clearstory of two-light windows in couples, and north and south aisles, with a three-light traceried window in each bay; these are divided from the nave by piers and moulded arcades, the pier-columns being of red Mansfield stone, and the bases and caps moulded and carved. The seating for the congregation in the nave and aisles is of yellow deal, and will accommodate about 600 persons. The choir and clergy seats in the chancel are of oak.

The baptistery is placed at the west end of the nave, and is an octagonal apse in plan, with a two-light traceried window in each bay, and wooden groined and ribbed roof, with a moulded arch leading to the vestibules on either side, communicating with the inner and outer porches on the north and south sides of the west front, and these latter communicate with the nave and aisles, and, together with the somewhat unusual treatment of the circular west window, produce an original effect. The arms of the patron, and a figure of St. George and the Dragon, are carved in vesicas in the porch gables.

The font is thus placed at the extreme west, and immediately opposite to the Communion-table. It is formed of Caen stone, enriched with marble shafts and jewels, with carved caps and emblems.

The pulpit is placed on the north side of the chancel-arch, and is also of Caen stone, arcaded, and with marble shafts, with a figure of St. George and the Dragon in a central niche.

The chancel is 40 ft. in length, and the same width as the nave, viz., 27 ft. 6 in., and is multangular at end in plan, with timber-groined roof, supported on marble shafts, with symbolical carving in the caps. It is approached from the nave by three steps, with four additional steps to the sacrarium, including the altar-pace. In the north wall is a credence, and in the south wall a sedilia.

The vestries are spacious, and are placed upon the south side of the chancel, that for the choir communicating with the south aisle, and the other with the chancel. The clergy vestry contains a piscina.

On the north side of the chancel is placed the organ-chamber, with furnace-room beneath, and tower rising above it to a height of about 90 ft. (when completed), with a pinnacle at each angle; that over the belfry-stairs rising to a further height of about 33 ft.

The outer walls are faced with Kentish rag-stone, laid in horizontal, though drop courses, the dressings being in Bath stone. The style adopted is early fourteenth-century English Gothic, and is consistently embellished. The builder is Mr. B. E. Nightingale, of Albert Embankment. The architect is Mr. William C. Banks, of Gracechurch-street, London. The tile paving was executed by Messrs. Hawes & Co. Mr. Robert Smith executed the pulpit and font, and Messrs. C. P. Kinnell & Co. supplied the heating apparatus. Some stained-glass windows have been set up in the church by Messrs. Lavers, Barraud, & Westlake.

MAUSOLEUM, WINDLESTONE HALL, DURHAM.

We give a sectional view of the Mausoleum which has been erected at Windlestone Hall from the designs of Mr. J. Dick Peddie, architect. The dome is supported by deeply recessed arches, and the whole light comes from the lantern and the piercings in the dome. The upper portion of the recesses is intended to be decorated with wall-paintings or mosiacs, the space below being reserved for mural monuments. The mason was Mr. Jas. Harkness, and the cost about 3,400*l*.

ALL SAINTS', HIGHGATE: NEW MISSION HOUSE.

The woodcut shows the view from the North Hill of the new Mission House for the district of All Saints, Highgate, which was dedicated by the Bishop of Bedford on July 21st of this year. Hitherto the work of the mission has been carried on in a small hired house, which for some time past had proved insufficient for the purpose. The work of the sisters in charge is to visit the sick and poor, and to dispense all the relief required in the district. Classes and guild meetings are also held here under the direction of the sister in charge, and the vicar, the Rev. Edgar Smith. Here is also a small convalescent ward for children either from the neighbourhood, or from poor parishes in London. The one-story building at the back is not yet built; it is intended for an assembly-room to be used for guild and parochial meetings, Sunday-school, &c., its place being at present occupied by a temporary building, which has long been used for these purposes.

The house contains, on the ground-floor, a sister's sitting-room, common-room, waiting-lobby, kitchen, scullery (fitted with soup-boiling apparatus, &c.), pantry, larder, stores, and other offices; on the first floor an oratory, four bed-rooms, and water-closet; and above, a small convalescent ward and dayroom for children, with nurses' room and lavatory.

The walls are of stock brickwork, faced throughout externally with Portland cement rendering and rough-cast panels and smooth margins. The plinth and chimney being of red brick, and the roofs tiled. The whole has been substantially built at a cost of about 1,300*l*. by Mr. Wheeler, of Highgate, from the designs of Mr. C. H. M. Mileham, of Gower-street, London.

SIR JOSIAH MASON.

AN ENCOURAGING CAREER.

The Josiah Mason College in Birmingham, of which we have before now given some particulars, will have been opened for work when this reaches our readers, and in a succeeding number we shall show what the building is like. In the mean time, a Birmingham correspondent sends us a sketch of the founder's remarkable career, the perusal of which may give heart to many a struggling brother. The moral of it is, Persevere.

Josiah Mason was the son of a journeyman carpet-weaver at Kidderminster, whose wife eked out the slender resources of the family by keeping a small shop, and by making and baking tea-cakes, in which art she possessed much skill. Josiah's first employment was assisting his mother in the shop and carrying round the cakes morning and afternoon to the houses of his mother's customers. The school-teaching he had was but slender, but it was supplemented by his mother's wise teaching and by the instruction he received in a Wesleyan Sunday-school, at which he was a regular attendant. When of sufficient age he became a Sunday-school teacher, and it was at this time that his peculiar mental acuteness of perception and his manipulative skill were first manifested. Writing was taught in connexion with the schools, and of course in those days the writing had to be done with quill pens. The attrition of the pen

and paper soon made the points of quill pens so blunt and rough that fair and good caligraphy required that the pens should be frequently "mended." This was an operation that few persons could manage successfully, but Josiah Mason soon became noted as a skilful pen-mender. So much was this the case that the pens from all the Wesleyan schools for miles round were sent regularly to Kidderminster for "Si" Mason to mend.

Josiah Mason's earliest mechanical employment was as a shoemaker, in which trade he acquired some skill, and in which he embarked in business on his own account while still a mere boy. For some reason, he abandoned this occupation and came to Birmingham at seventeen years of age in search of something different. He does not appear to have been successful, for he returned to Kidderminster and worked as a carpet-weaver for a year or two. He finally threw up that trade also, and came again in search of fortune to Birmingham, being then about twenty-one or twenty-two years of age.

At first Mason seems to have been singularly unfortunate in his endeavours to obtain employment. At length, however, he was engaged as a labourer at the Bagot-street Glassworks, where he was employed for some months wheeling-in coals and emptying the "caves," or tunnels under the furnaces, of ashes. Although employed in this menial capacity, he kept himself respectable, and having made the acquaintance of the daughter of one of the book-keepers of the establishment, he married her, and commenced housekeeping in one of a row of small houses, still standing, opposite the old glasshouse in Bagot-street.

Opportunity shortly offering, he left this uncongenial employment and worked at the gilt-toy making. Here his acute powers of observation, his delicacy of touch, and his manipulative skill, soon made him a superior workman, enabling him to earn good wages, and to make his little home comfortable. But after a time there came a period of commercial stagnation and a coincident change of fashion, so that Josiah Mason, in spite of his great skill, could get nothing to do, and became almost penniless. Wandering one day in a listless manner, a thought of his earlier days occurred to him, and he remembered his mother's skill in making tea-cakes. Going home and addressing his wife by the familiar name of "Tet," he asked "What coppers she could raise." Between them they "raised" 9d., which capital he thereupon invested in the purchase of materials for making some tea-cakes. Following her husband's directions, "Tet" made the cakes, which "Si," taking a basket, went out and sold, realising sufficient to double the invested capital, and to provide some food for himself and his wife. The next day, having a larger stock, his journey was extended, and he persevered until it was exhausted. Continuing this from day to day, he soon secured a "connexion," who looked for his daily coming, and bought his cakes readily. The frugal couple saved money.

Trade revived, and Mason went back to the gilt-toys, devoting his attention mainly to chains, rings, and other fittings for watch appendages. For these purposes he required a large number of split-rings, both of steel and of brass, for gilding, and those he had to purchase. He always bought them of a Mr. Samuel Harrison, a maker of these goods. Mr. Harrison was a man of most kindly and generous disposition; of simple and unobtrusive habits; of sterling integrity and of large mental endowments. He united great mechanical skill with considerable scientific knowledge. Dr. Priestley soon found out his capabilities, and for that great philosopher Harrison made an improved air-pump, and other elaborate scientific appliances. This brought Priestley frequently to Harrison's place, and the acquaintance between the two men ripened into a friendship so cordial that they generally spent two or three evenings a week in each other's society.

Mason's frequent purchases of rings brought about a degree of friendliness between him and Harrison, and the latter acquired a liking for his active and intelligent customer. In the course of conversation, Harrison one day told Mason that, having secured a competency, he was desirous of retiring from trade. Mason, with characteristic acuteness, caught at the idea, and a day or two afterwards told Harrison that he should like to have the business, but he had no capital. Harrison advised him to look up his friends, particularly his wife's father, to see if he could get assistance. Mason did so, and returned to Harrison to say that his father-in-law declined, and that he found it impossible to find a friend who would help him with a shilling. "Never mind, Mason!" said Harrison, "I've taken a fancy to you, and I've made up my mind you shall have the business; you shall pay me when and how you can." This was soon ratified, and the year 1823 saw Josiah Mason, without giving bond or other security, settled in Lancaster-street in succession to Harrison as a maker of split-rings.

Amongst other "odds and ends" left by Harrison, Mason found some curious bronze and steel pens which had been made half a century before by one Richard Parkes, a highly-skilled artificer, to whom Harrison had been an apprentice. He also found the duplicate of a pen made by Harrison himself for Dr. Priestley.

Some little time after this discovery, Mason, walking in Bull-street, saw in the shop-window of Mr. Peart, a stationer, a steel pen exposed for sale, which he bought at the price of two or three shillings, and took home. His early experiences as a pen-mender enabled him to estimate the deficiencies of this hand-made steel substitute, and the idea occurred to him that he could produce by mechanical means a far better pen at much more reasonable cost. Quietly and secretly working out this idea, he at length produced a pen which satisfied his ideas of completeness, and with which he found he could make a cleaner up-stroke than he had ever seen before. How to make his invention profitable to himself by bringing it before the public was his next difficulty.

At that time James Perry, a Manchester man who had removed to London, was actively engaged in agitating school reform, and in urging the employment of improved school books and appliances. He had already produced some pens, shaped by hand from ribbon-steel, which were on sale under the name of "Perry Pens." Josiah Mason, taking a few of his pens in his pocket, went to London and showed them to Mr. Perry. At that time Mason had no conception of any other use for his pen than as a school adjunct, but Mr. Perry, with commercial acuteness, saw at once that it must eventually supersede the quill. Arrangements were soon made by which Mason was to be supplied with ample capital; the pens were to be called "Perryian" Pens, and Messrs. Perry & Co. were to have the exclusive sale in England. This was in 1828; and the connexion then formed has been continued, with occasional modifications, ever since.

Josiah Mason continued in the penmaking business, the trade gradually extending, until the year 1876, when, being eighty years of age, he sold his business to his old friends, the Perrys, who combined with it two or three manufacturing firms, and formed a limited liability company under the name of "Perry & Co., Limited." This company has greatly extended the productive capabilities of the concern, their present production of steel pens being between forty and fifty thousand grosses per week, or something like a million of pens every day!

About the year 1840 Mr. G. R. Elkington took out his first patents for electro-plating, and in 1842 Mr. Josiah Mason, who by that time had become a rich man, joined him in partnership, introducing capital to the amount of 30,000*l*. The name of the firm of Elkington, Mason, & Co. is known all over the civilised world. Mr. Elkington died a few years ago, but Mr. Josiah Mason had previously retired from the partnership.

Mr. Alexander Parkes, the well-known inventor of "Parkesine," was at the time of the establishment of the firm of Elkington & Mason engaged by them in a series of experiments connected with electric deposition. In the course of his researches he made some discoveries which led him to think he could greatly improve upon the methods of producing "vulcanised" India-rubber. In the joint names of Parkes, Mason, and Elkington, a patent was taken out for these improvements, to which the name of the "cold" process has been given. Mr. Parkes, — who singularly enough is the grandson of the Richard Parkes who was the originator of the split-ring business, and nephew of Harrison, Mason's predecessor,—sold his share to Elkington & Mason for 5,000*l*. Soon afterwards they sold the patent to Mackintosh, of Manchester, for 80,000*l*.

One way or another Mason, in the course of years, became enormously rich. He was not blessed with children, and the question as to what was to become of his vast possessions became an anxious one, which was often discussed between him and "Tet."

At the time of the electro-plating and india-rubber experiments Mr. Parkes was a frequent visitor at Mr. Mason's house, sleeping there two or three nights a week. One evening, in Mason's absence, Mrs. Mason mooted the question of the ultimate disposal of their property, mentioning that Mr. Mason desired to do something for the elevation of women. Parkes, without much time for consideration, suggested that as orphan girls were often left in great destitution, and were exposed to peculiar temptations, something might be done for them. Within a fortnight of that evening the plans for the original orphanage in the village of Erdington had been prepared by Mr. Isaac Newey, and the project was set on foot.

Notwithstanding his many benevolences, riches poured in upon Mr. Mason from all quarters, and the great Orphanage at Erdington was at length determined upon. About 320 orphans, of whom 200 are girls, are boarded, lodged, clothed, and educated at this noble institution.

It is unnecessary to repeat in this place the details which have been published in connexion with Sir Josiah's last great institution, now opened. The Scientific College, entirely erected and endowed by Josiah Mason, is a fitting crown of his many munificent works. They were noble words that he spoke at the laying of the first stone:—"I have great and, I believe, well-founded hopes for the future of this foundation. I look forward to its class-rooms and lecture-rooms being filled with a succession of earnest and intelligent students, willing, not only to learn all that can be taught, but, in their turn, to communicate their knowledge to others, and to apply it to useful purposes for the benefit of the community. It is in this expectation that I have done my part, thankful to God that he has given me the means and the will to do it; hoping that from this place many original and beneficial discoveries may proceed, and trusting that I, who have never been blessed with children of my own, may yet, in these students, leave behind me an intelligent, industrious, truth-loving, and truth-seeking progeny, for generations to come."

GLASGOW MUNICIPAL BUILDINGS.

A NOTE.

Daniel Defoe visited Glasgow in 1727, "a large, stately, and well-built city," he remarks, and in reference to the Tolbooth, the municipal building of his time, says,—"Here the Town Council sit, and the magistrates try such causes as come within their cognisance, and do all their other public business; so that it will be easily conceived the Tolbooth stands in the very centre of the city. It is a noble structure, of hewn stone, with a very lofty tower and melodious hourly chimes." The "grund stane" foundation of the above building was laid on the 15th of March, 1626, on the site occupied by the old Tolbooth, for the taking down of which the wrights and masons received the sum of 250 marks. The work went on without break or hindrance, the civic power grudging no reasonable outlays. There was no stint of drink-money. John Neill contracted to supply the Tolbooth with a great new clock for 600 marks, but on the finish of the undertaking, the Council, finding Neill was a loser, added 300 marks to the sum, for "the clock was worth the whole sum." For "brass and copper to be the cock and vanes to the Tolbooth," 47*l*. 6s. were given, and William Duncan received for the "workmanship," 20 marks and the clippings. "One hundred pounds money" is given to James Colquhon in part payment of working the king's arms in stone "gilting"; and Valentine Ginking receives "thirty pounds" for gilding the cock, the thistle, crown and sceptre above the king's arms, and also gilding the town's arms above the entrance to the gable of the Tolbooth. One of the contracts connected with the Tolbooth is peculiar. In three weeks after the laying of the foundation stone, "Gabriel Smith undertook to sharpen the whole mason irons [chisels] during the time of the building of the Tolbooth and steeple thereof until the work be ended, for forty pounds money," and in case he should be a loser, "he refers himself to the will" of the council.

Morer, writing in 1689, says, "Glasgow has the reputation of the finest town in Scotland";

and Defoe, thirty-eight years later, writes of it, "In a word, 'tis one of the cleanliest, most beautiful, and best-built cities in Great Britain."

Doubtless, when John Boyd, maissonn, "hewed" out the town's armes 250 years ago, as he traced out the motto "Let Glasgow Flourish," he looked forward to the growing prosperity of the western capital of Scotland, which years after strives to maintain its olden reputation,—"the finest town in Scotland."

THE CAMBERWELL PROVIDENT DISPENSARY BUILDINGS.

At the bottom of Camberwell New-road, with a second frontage and entrance in Camberwell-road, facing the Green, a new Provident Dispensary is in course of erection, from the designs of Mr. Dank, architect, of Leadenhall-street. The building is being erected with red Berkshire brick. The windows and principal entrance in Camberwell New-road have arched heads in red Mansfield stone, and the elevation is surmounted by a carved cornice in Portland stone, above which is an ornamental parapet. The interior of the building contains a large central waiting-room, octagonal in form, lighted from the roof by an octagonal dome, above which is one of Boyle's ventilators. The other apartments in the building consist of consulting-rooms, and private rooms for medical men, together with drug-stores and dispensing-rooms at the rear of the building.

Messrs. Rider & Sons, of Union-street, Borough, are the builders.

RECLAMATION OF WASTE LANDS IN SCOTLAND.

Recently, the members of the Glasgow Town Council, on the invitation of the Cleansing Committee, paid a visit of inspection to the reclamation operations at Fulwood Moss. During the winter of 1879, when great distress prevailed among the working classes of Glasgow, and when extensive arrangements were being made for the relief of the unemployed, the question was mooted whether the Corporation could not find some work for those who had been so suddenly thrown idle. Among the many proposals made was one for the reclamation of Fulwood Moss, near Houston. A more unpromising piece of ground could scarcely have been selected. It was really and truly a large peat-moss, over which it was almost impossible to walk with safety. The idea was, however, taken up, and, after negotiations, Lord Dunglass granted a lease of that portion to the north of the Caledonian Railway, a short distance west of Houston Station. The lease is for thirty years, at a rent of 1s. per acre for twenty years, and 5s. per acre for the remaining ten years. It was looked upon principally as a shoot for the mud and surplus manure which was lying in the various scavenging depôts and threatening to be a nuisance to the city. It would also, it was urged, give employment to a large number of unemployed, who were then thronging the streets, and whose relief was a problem of difficult solution. As soon as all the preliminary arrangements were made, upwards of 300 of the unemployed were taken down to Houston and set to work on this most unpromising task. Thirteen acres next the main line of the Caledonian Railway were first operated on, the idea being to have this part planted with potatoes, so as to secure seed for the next season. In this Mr. James Young, who had charge of the works under the Cleansing Committee, was successful; for not only did he secure a crop sufficient to seed the 95½ acres to be cropped next season, but was able to sell a considerable quantity. During last summer a service railroad was laid, and this has been so placed that all parts of the extensive moss can be easily reached. Draining was also accomplished, and this has been so successful that already the moss is 2 ft. lower than it was before operations were commenced. In the course of the work a staff of men were employed reclaiming the remaining part of the moss, the average number so occupied, from February, 1879, till the 25th of May this year, being seventy. Since the work of reclamation was commenced no fewer than 1,882 wagons, or fully 12,000 tons, of Glasgow rubbish have been placed on the moss. The railway and its adjuncts cost 1,214*l.* 19s. 4d. A movable bogie railway for the purpose of facilitating the spread of the manure and the ingathering of the crop cost 99*l.* 12s. 11d. There was spent in ditching and draining 1,784*l.* 5s. 10d., and for trenching and hoeing 956*l.* To these items have to be added 463*l.* 16s. 7d. paid for the fares of the workmen to and from the moss, so that the total sum expended on the reclamation of this ninety-eight acres of moss has been 4,538*l.* 14s. 8d.

DISCLOSURES RESPECTING SUBURBAN DWELLINGS.

At the Edmonton Petty Sessions, before Messrs. Abbiss, Howard, and Doe, divisional justices, James Henry Etheridge, builder, 17, Heaton-place, Peckham-rye, was summoned, at the instance of the Tottenham Local Board of Health, for infringing the 104th bye-law of the said Board, which provides that the foundations shall rest on solid ground or upon concrete or other solid substructure. Louis Etheridge, builder, of 252, Lower-road, Rotherhithe, was summoned for a similar offence, the houses in respect of which the proceedings had been taken being situate in Circular-road, Stoneley South Estate, Upper Tottenham.

The case against Louis Etheridge was taken first.

Mr. de Pape, surveyor to the Board, deposed to his attention having been called by the building inspector to the material used in the foundations of the houses in question; he visited them on the 2nd of September, and found that the walls were being erected upon improper foundations,—first, upon other than solid ground; and, secondly, on an artificial foundation, made up of loose material not suitable for the purpose. The ground was but little firmer than turf, and the so-called concrete consisted of brick rubbish, spent lime, and other materials from old buildings, and had been put in dry. Notice was served upon the defendant that the material being used was contrary to the bye-laws, and on the 6th of September witness made a further examination, and took samples of the foundation under each wall.

The defendant considered the justice of the case would be met by his promise to amend. Besides, his foreman was absent through illness.

The Bench imposed a penalty of 5*l.* and costs.

The features of the case against the other defendant were similar to those above reported, and he was also ordered to pay the full penalty of 5*l.* and costs, Mr. Abbiss remarking that the Local Board were simply doing their duty in prosecuting.

THE DOCTORS AND THE ARCHITECTS.

Sir,—I think attention should be drawn to some matters which should not be left unnoticed in the *Builder*. There appears to be a sort of concerted action on the part of a certain section of the medical profession of late to weaken the influence of architects and engineers in drainage and sewerage matters, and, indeed, in sanitary questions generally. I have had my eyes upon this movement for a considerable time past, and I have good ground for my suspicions that some sanitary organisations have been started, the chief objects of which have been to assist a section of the medical profession to rule the roast in sanitary leadership, and make architects to play second fiddle to them. Some of the medical journals are also assisting. This move has been worked in Dublin as well as in London, and is being worked at present; and one sanitary association across the Channel has been worked with energy, and has succeeded in its object of pitchforking its prominent members into official appointments.

Take note of some medical men's opinions at the late Exeter Sanitary Congress, and particularly observe the impertinent allusions of Mr. H. C. Burdett anent architects and the Institute of Architects.

The Local Government Boards in London and Dublin are worked to a great extent by the medical element, and the Poor-law doctors in connexion with, or under, that institution, if they are allowed to go on with their wings unclipped or unchecked, will soon be betraying effrontery enough to snub architects and engineers generally.

It appears to me that architects and engineers are allowing the doctors to lay their eggs like the cuckoo's, and with the usual results. It is time that a wholesome check should be put to medical men's dictation and abuse in house construction and drainage matters, and that they should be kept as far as possible to their legitimate spheres. If curative medicine is becoming a non-paying game, the doctors should not be allowed an undisputed claim for the new departure in respect of preventive medicine, a cause in which you yourself have worked for more than half a lifetime, with a few other veterans.

The great body of the medical profession were not merely inert when the *Builder* was first pointing out existing evils in our towns, and the necessity of sanitary improvements, but many of its members, as I well remember, were sneerers at the movement, and even positive obstructors. The communication from Mr. Chadwick, which you published in the last issue of the *Builder*, *re* drainage and sewerage work as a specialty, is very good in its way as an exposition of bad drainage work, but, in my humble opinion, it would neither be prudent nor advisable to aid the organisation of a class of specialists. It would lead to the further subdivision and weakening of the architectural and engineering professions, who have already, and can have in future, sufficient capable members of their bodies to grapple with all the problems of drainage and sewerage work as part of their general practice. Do not let the architectural profession be weakened or cut up at the bidding of doctors, few of whom know anything practically of drainage work. H.

THE EDUCATION OF THE WORKMAN.

Sir,—Many things in recent numbers of the *Builder* interest me much.

Respecting the "dignity of labour," speaking as the father of a numerous family, now for the most part out in the world, I have felt that it was my first duty, after providing for their immediate wants, to teach them such a trade or calling as would practically make them independent. I hold that it is the first duty of every parent to teach his child some useful trade by which he or she may get its living. Mere quill-driving by no means satisfies this condition, nor does mere buying and selling goods. I have, therefore, put each and all of them to a handicraft trade, as is the excellent practice in Germany; and so both hand and eye are educated, and if they possess brains and energy besides, they may rise to be in the end captains of industry. In no case are they likely to become drones in the hive.

Whether the handicraft trade should be taught under the conditions of an apprenticeship, or otherwise, is a matter very difficult to decide. There can be no doubt that in small works, where the master takes an active part in the conduct of the work, and being himself a competent workman taking an interest in his men, as was almost always the case in times gone by, then it was right and proper to apprentice the learner. But in large works, where the master is probably only a managing director, with little practical knowledge of the work, and the youth is put to an already overcrowded trade, where every workman is jealous of any addition being made to the number of his competitors, and has no inducement given him to teach; where the foreman has much the same feelings, and no time for teaching, having to strain every nerve to get the utmost out of both men and machinery to keep his place, and satisfy his managing director, and earn a large dividend,—where, in fact, no one below the foreman is taught to think, but only to obey, then it is an open question whether apprenticeship is desirable. I know it is largely practised under such conditions, and the boys are put to do one particular thing, which they soon learn, and they are kept thereafter to that only for the remainder of their term, to their own detriment and their employers' profit. I took the liberty, some years ago, of remonstrating with the managing director of a large machine-works in the North about this practice, but I only obtained for answer that he had got a dividend to earn, and must not be too particular how he earned it.

The lament of the decay of the useful general workman is by no means new. Some thirty years ago the late Sir William Fairbairn, in the preface to his "Mills and Millwork," pointed out how the old millwright had been superseded by the fitter, the turner, the machine-maker, *et hoc genus omne*, and was consequently, to a great extent, dying out. The same division of labour has taken place in the building trades, though to a much less extent. The mason is now a banker hand or setter, seldom both. The carpenter *and* joiner is now very frequently dissociated. The "three-branch hand," plumber, painter, and glazier, is only to be found in remote districts. But the man who has to direct all these, in the superintendence of any important building works, must have as practical, although not as manipulative, a knowledge of the several trades, as though he had been taught each of them separately. The eye and head have been taught, in his case, without the hand. And so it has come to pass, that for those who are intended from the first to take a

leading position in mechanical engineering, special schools have been opened, like that at the Crystal Palace at Sydenham, for the purpose of teaching the hand as well as the head, and this teaching is stimulated by the scholarships established by Sir Joseph Whitworth. The result of all this is that our mechanical engineers who occupy positions of authority, are able to maintain that pre-eminence they have always held as regards general knowledge. Not so the rank and file. Very frequently these are reduced to the level of mere machine-tenders, and are paid little if any above the ordinary labourer.

Whether it would be possible to establish special schools for those who are to direct building operations is open to question. I have not yet heard that it has been attempted in England. Theoretical knowledge can be and is largely in use, but nothing can supersede the practical knowledge only to be gained by experience on the works, which are of such infinite variety, that we never build twice alike, and the conditions under which the works are carried out are never twice alike. Hence, doubtless, the catastrophes, &c., to which you allude. That the average workman in the building trade is not so good a workman as his predecessors in the past, is, in my experience, undeniable,—a fact due in great part to the wretched system of paying all alike, and so leaving no room for emulation; and also to the fact that many—perhaps most—of the men waste their leisure in music-halls and other equally enervating and unprofitable amusements; and the main reason why their wages have not been reduced, as those of the engineers have been, is that hitherto machinery has not been profitably adapted to do the work.

E. G.

ALTERATIONS IN AND ABOUT NORWICH CATHEDRAL.

Sir,—In expressing my gratification at the honourable mention made of my remarks on the supposed Saxon remains attached to Norwich Cathedral on the occasion of the visit of the Architectural Association to East Anglia, I hope I may be allowed to express also a regret at the passing over in silence of some remarks which I ventured to make on the wanton mutilation of the billet mouldings over several of the arches of the cathedral. Over the west door in the inside, and in part of the nave and the transepts, they have been entirely removed; and, what is in still worse taste, over the arches between the organ-loft and the jambs of the tower they have first been hacked and mutilated, and then covered with a coating of plaster. Thus a sham circular moulding is produced, like nothing that can be found in any work on architecture. This spurious moulding had been previously noticed by Mr. Brown, the architect, and by Mr. Spaul, who also pointed out the entire excision of the billet mouldings in various places. I should mention also that the Dean had concurred in a representation which I made to the Dean and Chapter on the subject, and exhibited his good feeling and judgment by ordering the billet moulding to be replaced over one of the arches on the north side of the nave at his own expense.

Now in advocating this restoration of Norman work, which has been wantonly innovated upon, I will add that I will yield to no one in my desire to retain, as far as possible, the joint works of different periods in our venerable ecclesiastical buildings. They ought to be regarded as historical monuments, blended and associated together, and frequently producing a harmony exceeding that of the original uniform design; but a line must be drawn against such alterations when they are utterly uncalled for, as in the destruction of the billet mouldings in Norwich Cathedral; and I beg to point out another still more glaring instance of demolition perpetrated, when two of the jambs of the tower were cut back about 2 ft., in addition to the removal of the pilasters, which were carried down to their Norman basis, making not less than 3 ft. of the solid masonry and support of the tower and the spire. It appears as if the architects of the time were desirous to show experimentally how much of that support might be withdrawn without endangering the finest part of the edifice. The pilasters, when truncated, were stopped by moulded drops of plaster or cement, and the plane of wall, when cut away, was covered by carved woodwork, forming stalls for the Precentor and the Minor Canons of a later date than the carved stalls of the Honorary Canons. I endeavoured to represent at the visit of the Architectural Association that the tower jambs, which at present suggest the painful idea of insecurity of the fabric, ought to be restored; and my object in now addressing you is simply to crave your influence in bringing about this embellishment to our cathedral. An argument in its favour is that no injury or loss will be sustained by the removal of the stalls, as there is room for the Precentor and the Minor Canons in those appointed for the Honorary Canons.

John Gunn.

WIND PRESSURE.

Sir,—I have found it useful to note down any account of violent storms, and possibly you may consider the following worth notice.

The *Elgin Courant*, about thirteen years ago, published the following:—

"The wind recently blew a hurricane at Keith, and the focus of the storm was at the Isle Mills, near the railway station. The wind lifted one of the roofs, the outside one, 100 ft. long and 30 ft. broad, and without a plank falling. The whole was borne 20 ft. high in the air, and was carried over three houses, when it came in contact with the engine-stalk, and knocked it over from the foundation. The stalk was 50 ft. high. Without it being in the slightest degree arrested in its progress through the air, the flying roof passed over the ruins of the engine-stalk, and, coming into contact with a cloth and yarn warehouse two stories high, smashed the slates of it, carried away its chimney, and then spread over the road in pieces, involving the railway telegraph-wires in the ruin. The roof flew,—body bulk, as the phrase goes,—more than 60 yards before it came to the ground, and, what is even still more surprising, it rose from a one-story house, and passed over two-story houses."

Mr. Peter Carmichael, in his paper on Factory Chimneys, read before the Institute of Engineers in Scotland, states that in 1864, at Dundee, there was a violent storm of wind, worse than had been experienced for twenty years previously. This gale considerably damaged some shafts which he describes.

On the 16th of December, 1873, the *Sheffield and Rotherham Independent* published an account of "a gale which swept over Sheffield and neighbourhood, almost unparalleled for intensity and violence," it blew down nine large chimney-shafts, and doubled up the principals of an iron roof being erected at the gas-works, and caused a great loss of life, of which they give the details.

In June last I had the following sent me:—

"Professor Tice, of St. Louis, has recently disclosed the results of a tour of inspection he has been making over the track of the tornado which wrought such havoc in the Valley of the Missouri some time ago. This terrific 'wind,' as everybody supposed it to be, performed some astounding feats. It bore off a factory-chimney for a considerable distance, and literally demolished a large number of buildings, while its effects on trees and shrubs were of the most curious character. In many instances it did not tear them up by the roots, but tore off the bark from their stems, and that not only on the side exposed to the storm, but all round them, while the ends of branches were stripped of their leaves and split up into fibres. Professor Tice affirms that all this was the work, not of wind, but of electricity; that, in fact, it was not a tornado of wind at all, but a terrific electric disturbance. The chimney just mentioned was carried off by the storm, though the building from which it was wrenched was left almost untouched, the fact being that the chimney was an iron one. In many cases the Professor found that buildings with iron roofs were rent in pieces, while others directly in the path of the storm, but which had ordinary shingle roofs, were left untouched. The action on the trees he explains by assuming that the sap and moisture of their trunks and branches were by the electric current passing down them converted into steam, the sudden expansion of which tore the bark and twigs into fragments. He notices, too, that for 145 miles the storm followed the track of a railway, and, as it were, swallowed up all the water in its course. All the facts he discovered tend to convince him that there really was no wind in this tempest, but electricity only, and that, as we understand it, he takes to be the case with cyclones generally. If this view is supported in the law courts, it will no doubt be found that the damage done by such tempests must be compensated for by those who insure against 'lightning.'"

The late Professor Rankine paid great attention to wind-pressure, as may be seen from his account of the chimney at the West Cumberland Hematite Ironworks, and other writings.

I trust some of your numerous correspondents will continue this important subject.

R. M. Bancroft,
Mem. C. & M. E. Society.

Is it True?—The *American Architect* says: "A cablegram from Scotland states that a joint stock company which has been forming in Great Britain for the purpose of purchasing timber and controlling the lumber market has been completed, and has now control of Messrs. Cooke & Grant's 'limits.' This is a beginning of a gigantic scheme, which will throw a large amount of British capital into this country."

WATER SUPPLY OF BRADFORD.

The Barden reservoir works, which are being constructed for the Corporation of Bradford, in order to give additional supply of water to that growing town, have been in progress for about four years. The new reservoir will cover an area of from 70 to 100 acres, and will have a couple of bye-channels (one at the north and the other at the south), by which waste or unnecessary water may be let off. It will be somewhat of a triangular shape, and will require a bank on one side only, as the natural formation of the earth will form the sides of the basin on the remaining portion. It is this single bank which has caused so much work and labour, for at its base it is several hundred feet in width, whilst in some places it will rise to the height of over 100 ft. above ground (to say nothing of the great depth below) and will be something like 30 ft. in width at the top. For a long time past the energies of the staff have been devoted to this bank, which has a central portion of concrete of considerable thickness, then puddle on either side on account of its effective resistance to percolation, and then, outside the puddle, massive coverings of stone, the whole forming an immense boundary-wall, which one would think sufficient almost to withstand a second Deluge. This artificial embankment is upwards of half a mile in length. There are two principal streams by which the reservoir will be filled, namely, those of Yethersgill and Fadmire Syke; whilst two channels will also connect Gill Beck and Lumb Gill with it. When completed it is estimated to hold 800 million gallons, and the contract for the work is 200,000*l*. The work has been going on for about four years, and it is hoped it may be completed in a couple more years. Mr. Easton Gibb is the contractor, his principal assistants being the manager (Mr. Alexander Riach), Mr. Malcolm, C.E., and Mr. J. H. Smith, C.E. The reservoir is being constructed from plans by Mr. Binnie, engineer to the Bradford Corporation; and the interests of that body are looked after by Mr. Yourdi, C.E. (their resident engineer), and Mr. Johnson, who inspect and measure the work as it progresses.

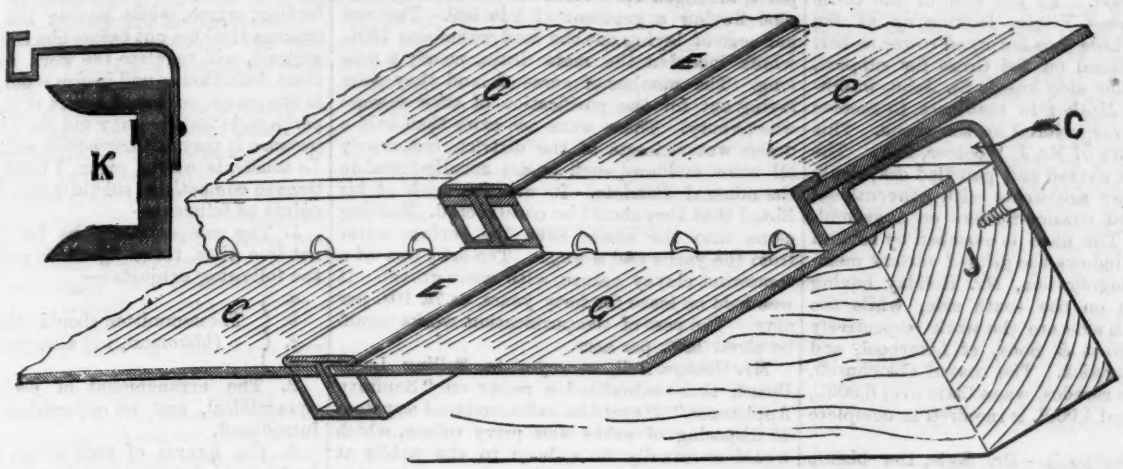
PROVINCIAL NEWS.

Stafford.—At a special meeting of the Stafford Town Council, plans were approved of for the erection of a new wing to the Borough Hall. The new building, which is estimated to cost something under 2,000*l*., is destined to hold the free library, which was sanctioned by a public meeting of townspeople some time ago, the Wragge museum, and the school of art, which has outgrown the present accommodation provided in the Borough Hall.

Smethwick.—The new building erected for the purposes of a free library and reading-room at Smethwick, and recently opened by Mr. M. A. Bass, is situate at the rear of the Gas Offices in High-street. Its main room, which is to be used both as a reading-room and library, is 52 ft. long by 24 ft. wide. It is light and airy, and is fitted up with the usual reading-desks, tables, and stands. The building, which was designed by Mr. Yeoville Thomason, of Birmingham, has been erected by Messrs. Harley & Sons, Smethwick, the cost being 1,800*l*.

Carlisle.—The large new hotel on the Victoria Viaduct, Carlisle, is approaching completion. Externally it is in the style called "Queen Anne" or "Free Classic." The ground-story is entirely of red stone. The south-east corner is corbelled and carved, and the effect is heightened by the mixture of red and white stone throughout the façade,—the white being from Lazonby, and the hardest building stone in the district, while the red is the sandstone of the district, from Aspatria. On the eight pilasters there are carved illustrations of Æsop's fables; and on the east front are two large panels, one showing the heraldic arms of the city of Carlisle, namely, a cross and four roses surrounded by a floral device, with the legend, "Be just and fear not"; the other showing a device of the rose and thistle intertwined, with the date, "1880," on a shield. The building is finished with a Mansard roof, out of which project dormer windows. There are no fewer than 126 rooms in the hotel, upwards of eighty of them being bedrooms. Though the rooms are so numerous, they are arranged on a simple plan. On each floor they open upon the central corridor, which, like the passages and staircases, is built of stone and concrete; and the whole of the

RENDLE'S NEW PATENT "ACME" GLAZING.



C. New Patent "Acme" Horizontal Bar.
E. New Patent "Acme" Vertical Bar.
G. The Glass.
J. Wooden Purlin, showing method of fixing Patent Bar.
K. Channel Iron Purlin, dispensing with wood of any kind.

walls are brick on iron girders, and hydrants for use in case of fire are placed in each lobby. On the ground-floor, on entering, is the coffee-room, 34 ft. by 20 ft., on one hand, and the commercial-room, 44 ft. by 20 ft., on the other; also the bar, smoke-room, bar-parlour, manager's room, still-room, billiard-room, 46 ft. by 25 ft.; and billiard and smoke room, 33 ft. by 20 ft., &c. On the first floor there is the ladies' coffee-room, the assembly-room, 46 ft. by 25 ft.; lavatories, &c., luggage-room, and suites of sitting and bed rooms for families. The first, second, third, fourth, and fifth floors are appropriated for bed-rooms. The hotel stands upon a part of the old city wall.

Eccles (near Manchester).—The foundation-stone of the new Town-hall was laid on the 13th ult., by the chairman of the Local Board. The building is of the Classic style of architecture, and comprises,—in the basement, hall-keeper's residence, heating apparatus, coal and store cellars; on the ground floor, a board and committee room, with ante-room, hat and cloak room, lavatory, &c., adjacent. Rooms are also provided for clerk, surveyor, collector, and inspector. The upper floor comprises a public room, with gallery and platform, affording accommodation for 1,000 persons, also retiring-rooms and other requirements. The principal elevations will be faced with stock bricks, relieved with Huddersfield stone to the doors and windows, &c. The contract has been undertaken by Thomas Moore & Sons, builders, of Eccles, at the sum of 4,000*l.* The architect is Mr. John Lowe, of Manchester.

RYAN'S PLUMB-RULE.

The ordinary plumb-rule with its leaden "bob" always getting out of gear, and the string twisting in wet weather, and sometimes breaking in dry when not expected, is an awkward instrument. Feeling this to be the case, an ingenious bricklayer, John Ryan, has devised, and protected, a plumb-rule to which these objections do not apply. In a sinking on the face of an ordinary "straight-edge" a thin metal rod, weighted, is hung pendulum-fashion, and its point, gravitating over a certain number of divisions marked below, shows not merely when the rule is or is not upright, but the exact extent of deviation, so that it also becomes particularly useful in building chimney-shafts or giving the right batter to a retaining wall. The rod is covered with a thin plate of metal to keep it in its place, the point only being shown, so that however the rule may be thrown about, it cannot get out of order. It may be had for a few shillings, and we are led to go a little out of our way and say that the inventor has made a number of them, and that his address is No. 50, Lockington-road, Battersea Park.

Art Classes for Ladies.—We are glad to hear that Mrs. E. M. Ward's classes are well supported. They will re-assemble on October 15th next at 6, William-street, Lowndes-square. Mr. Calderon, R.A., Mr. Alma Tadema, R.A., and Mr. W. P. Frith, R.A., are the visitors for the term.

RENDLE'S NEW PATENT "ACME" GLAZING.

The "Acme system" is the title given to the arrangement of glass roofing lately patented by Mr. Rendle, and the accompanying diagram will serve to explain it. The advantages appear to be that the lap is greater; and there being no clips, the water runs freely away; further, the channels of the vertical bars are square, thus filling the slot in the horizontal bars, as will be seen in the sketch; and the purlins are narrower, giving increased light. The new bars can be used without wood (see fig. K), thus giving an indestructible roof both inside and out. Another advantage is that there is no drip from condensation, the moisture running into the patent bar and on to the outside of the roof. The system has been adopted at St. Bartholomew's Hospital.

STATUES.

Robert Burns.—The bronze statue of Burns for New York has just been completed by Sir John Steel, R.S.A. The statue represents the poet in a sitting posture, and the figure is colossal, being about 12 ft. in height. The incident in Burns's career which the artist has represented is that when, on the anniversary of the death of Highland Mary, he composed the pathetic poem commencing, "Thou lingering star with lessening ray," &c. The poet is represented as seated on the trunk of an elm tree, attired in the garb of a husbandman of the period, with a plaid thrown loosely round his shoulders. A replica of the statue has been bespoken for Dundee. The statue was unveiled on the 21st ult.

Denis Papin.—On the 29th of August a statue of Denis Papin was unveiled at Blois, where he was born in 1647. Papin, who was a Protestant, spent the greater part of his life in exile, living sometimes in London and sometimes at Cassel and Marburg, where he invented the celebrated steamboat on which he ascended the Weser, to the horror of the native peasants, who seized it and broke it up, believing it to be the work of the Evil One.

STAINED GLASS.

London.—The old windows over the communion-table in the Church of St. Katherine Cree, Leadenhall-street, are being replaced by a series in stained glass, emblematical of flowers, which Mr. W. M. Pepper, of Euston-road, is supplying. They are five in number.

Addiscombe.—Messrs. Britten & Gilson have just now executed and fixed a stained-glass window at St. Mary Magdalen's, Addiscombe, Croydon, for the Committee, in memory of the late Mr. Theodore Lloyd, the subject being the Ascension. We hear that it is very boldly treated.

Kingston (Surrey).—A window has recently been placed in the parish church to commemorate the late Mr. H. Shrubsole, formerly mayor of Kingston. It is designed to illustrate the latter part of the twenty-fifth chapter of the Gospel according to St. Matthew, with more especial reference to the fortieth verse, part of which is inscribed under the subject. Our Lord, crowned, and bearing in his hands and feet the marks of his Passion, stands in the central light of the window, and on either side of him are the blessed whom he is calling to inherit the kingdom prepared for them from the foundation of the world. The groups consist of men, women, and children, and an angel is conducting them into our Lord's presence. The figures are placed under canopies of tabernacle work, designed in accordance with the character of the masonry of the window, which is of the fourteenth century, and in the tracery or upper lights there are figures of angels bearing scrolls, on which a portion of the text referred to is written. A memorial brass tablet is in course of preparation, and will be erected upon the wall beneath the window. The window and brass are the work of Messrs. Lavers, Barraud, & Westlake.

Coventry.—A four-light stained-glass window has just been placed in the west end of Holy Trinity Church, in memory of the late Mr. W. Chater, organist of the church. The window illustrates Christ's teachings in the two great commandments, "Duty towards God and duty towards your neighbour." The window was designed and executed by Messrs. Heaton, Butler, & Bayne, of London.

CHURCH-BUILDING NEWS.

Walton-on-the-hill (Liverpool).—On the 10th ult. the new church of St. John the Evangelist, Walton-on-the-Hill, was consecrated by the Bishop of Liverpool. The foundation-stone of the church was laid on Easter Monday, 1876, by Lord Skelmersdale, now the Earl of Lathom. It was opened for service, under the licence of the Bishop of Chester, on May 17th, 1878, but was not consecrated owing to the debt upon the building, which has now been removed. The portion of the building now completed accommodates about 600 worshippers. When carried out in its entirety according to the plan, it will consist of chancel, nave, and side aisles, with five bays, two vestries, and lofty tower at west end. The total length of the church when completed will be 131 ft., the nave being 33 ft. 6 in. wide, and 60 ft. high, and it will then accommodate about 1,000. The contractor is Mr. Hugh Yates, the architects being Messrs. Aldridge & Deacon. The style of the building is an adaptation of thirteenth-century Gothic, treated in a simple manner. The materials of the walls outside are local red-stone, the interior stonework being entirely of the variegated red and white stone from the Runcorn quarries. The chancel is divided from the nave by an elaborate wrought-iron screen and gates, and is paved with marble mosaic. It still awaits decoration, permanent choir-stalls, and organ cases. Foremost among the ornaments of the church is the costly reredos given by Mrs. Gerard Leigh, of Luton. This consists of a polished and inlaid red marble framework rising to a height of 14 ft. 6 in. above the sanctuary floor, and enclosing a white marble panel 6 ft. wide by 4 ft. 6 in. high,

in which is sculptured in high relief the subject of the Crucifixion. At the foot of the Cross kneels the blessed Virgin, looking up at the dying Christ, whose face is turned towards her. Her hand is placed on the Cross for support, while on the other side kneels St. John, watching the Virgin Mother in readiness to receive her if she fall overpowered by the scene. This group is the work of Mr. J. Woolner, R.A. The altar is of dark carved and panelled oak, richly decorated by the architects with conventional roses, lilies, and passion-flowers on a ground-work of gold. The nave is enriched by several stained-glass windows, the gifts of various members of the congregation, Mr. Holiday having designed those on the south side, while the two on the north side are the work respectively of Messrs. Forrest & Sons, of Liverpool, and Mr. Holt, of Warwick. The cost of the church, exclusive of the reredos, was a little over 6,000*l.*, and an additional 4,000*l.* is required to complete the edifice.

Maghull (*Liverpool*).—Dr. Ryle, the bishop of Liverpool, has consecrated the new church of St. Andrew, at Maghull. The new building is in marked contrast to the small structure which it supersedes, and consists of a chancel to the east, with transepts at each side, the north transept being used as a chapel for the school-children, and in the south transept is placed the organ. The style is Gothic of the Early English period. The walls of the chancel internally are lined with polished ashlar stone. The arches, strings, label moulds, and jambs of the arcade and windows are deeply moulded, and finished with carved capitals and bases. The altar-cloth, the gift of Miss Hollingshead, is from the factory of Messrs. Jones & Willis. The nave has an arcade of five bays on each side, and a lofty clearstory. The roofs of nave, aisles, transepts, and porch are open-timbered, of pitch pine, varnished. The various dimensions of the church are:—Total length over all, 127 ft.; total width, not including porch entrance, 54 ft. 6 in.; the nave, 68 ft. 6 in. by 24 ft.; north and south aisles, 68 ft. 6 in. by 12 ft. 9 in. each; vestry, 14 ft. square; tower, 21 ft. square by 72 ft. high; the height of church to apex of nave roof, 45 ft.; the chancel, 29 ft. 6 in. by 20 ft. 6 in.; organ-chamber and chancel, 15 ft. 6 in. by 13 ft. The whole of the work has been carried out from the designs of the architect, Mr. James F. Doyle, assisted in the superintendence of the work by Mr. S. Guning, clerk of the works. Mr. James Lesley was entrusted with the sole contract, the joiners' work being executed for him by Mr. Samuel Webster, of Bootle. The glazing in the chancel is by Messrs. Edmundson & Co., of Manchester; the tiling by Mr. Laidly Brown; the mosaic pavement by Messrs. J. Rust & Co., of Lambeth; the heating apparatus and lightning-conductor by Messrs. J. R. Cooper & Sons, Liverpool; the lamps and ornamental metal work by Messrs. Freeman & Collier, of Manchester; and the carving in the church is by Mr. Joseph Rogerson, of Liverpool.

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS.

On the 24th ult. the first conference of the recently-formed Northern District Branch of this Association was held in Darlington. The President of the Association, Mr. A. W. Morant, borough engineer of Leeds, occupied the chair. Mr. P. W. Thompson, C.E., of Willington Quay, who has taken an active interest, along with Mr. Hall, Stockton, in forming the Branch Association, was unanimously elected district secretary, and it was agreed, after some conversation, that there should be no hard and fast rule in the settlement of the boundaries of the Northern District, which, it was understood, will now include the North Riding of Yorkshire.

Mr. Craggs, of Shildon, read a paper on the scheme suggested by him for the disposal of the sewage of the Shildon and East Thickley Local Board district. The population of the district is 10,000, but sufficient capacity has been provided in the outfall drain for 50,000. Provision is made for rainfall and surface water by a separate set of drains, which are exclusively used for this purpose. There are two subsiding tanks, each 150 ft. in length, 9 ft. wide, and 6 ft. deep, built of 9-in. brickwork in lime mortar, the sides having a 3-in. batter upon them. The paper described the under-drainage and the surface preparation, in respect of which latter it was said that the twenty acres of land used for sewage disposal were divided into four parts, arranged upon three different levels, each plot having a gradient of 1 in 400. The cost per acre of laying out the land was about 190*l.*, which included the main drain, nearly a mile long. The number of acres of land they were laying out for the purification of their sewage was twenty. There were not more than half a dozen water-closets in the district, but nearly all were middens, such as are usually found in the mineral districts. It was the wish of his Board that they should be constructed. Nothing came into the sewer save the surface water from the yards and sewage. The land was of a somewhat clayey nature, with some gravel. It was held on lease for forty years, at 7*l.* 10*s.* per acre. The cost of the purification works would be about 100*l.* per acre.

Mr. George Bell, surveyor to Felling Local Board, then submitted a paper on "Sanitary Appliances." He said he had introduced a system of disposing of ashes and privy refuse, which would eventually be a boon to the public at large, especially the working classes. It comprised a self-acting water-closet and a dry ash-pit combined, designed and patented by Mr. A. M. Fowler, borough surveyor, Newcastle.

Mr. Hall said they had recently commenced to adopt Mr. Fowler's system at South Shields, and there it seemed to answer admirably.

Mr. Vawser confessed that as an occasional observer of the working of Mr. Fowler's system, he was highly pleased with its efficiency. The tub system, in his opinion, did not meet the difficulties of the situation.

The members then visited the Darlington Iron Company's works, in the office of which luncheon had been provided. They next proceeded to the Darlington Corporation Sewage Farm, over which they travelled under the guidance of the borough surveyor, Mr. T. Smith, who fully explained the engineering features of the scheme. At present the farm covers some 225 acres, though at the end of the year the corporation will come in possession of ninety acres more. 1,153,000 gallons of sewage on an average are dealt with every twenty-four hours. The farm, as a farm, about clears its working expenses. The party finally visited the works of the Stockton and Middlesbrough Water Board, at Tees Grange, about two miles and a half from Darlington Market-place, the water being drawn from the Tees, which is here about forty-seven miles from the source, and the same distance from the month. Mr. Simpson, the secretary of the Board, officiated as conductor. The land occupied by the Board at Tees Grange is twenty-seven acres in extent, eighteen acres of which are covered by works. The total area of the filtering beds is 142,000 square feet, while there are two tanks holding 2,500,000 gallons each, and one tank containing 1,500,000 gallons. The population of the district supplied is 130,000. About 50,000,000 gallons per week are pumped, 32,000,000 of which go for manufacturing purposes.

In the evening the members dined together at the King's Head Hotel.

SCULPTURE.—BLACKFRIARS BRIDGE.

The Chairman of the Bridge House Committee has objected, and the majority of the Court of Common Council have concurred in thinking it undesirable, that the regulations to govern this competition should be made known and well-considered and discussed before sculptors are invited to compete, and probably nothing more will now be heard of the matter until it is too late.

It is not often that so grand an occasion to encourage the noble art of sculpture arises, and there are, no doubt, many like myself, who, with no personal ends to seek, no particular artist to patronise, anxiously desire that the result may not be a failure, like so many other art competitions, but a great success, alike to the Corporation, who, to their honour, so liberally defray the cost, and for the artists who may be engaged in the work.

If the Chairman really thinks, as he said, that it is sufficient merely to invite sculptors to send in models, or that crayon sketches may be requested in the first instance to select from, I say unhesitatingly, disappointment will ensue.

A sculptor's sketch is made in clay; he does not affect the pencil, and the sketch in clay is a long and rather expensive matter from first to last. No artist of eminence will be likely to waste his time upon it, unless carefully-framed instructions put all competitors on a general footing, which, while leaving the artist free to express the idea put before him as his genius may suggest, will regulate the work by such a sufficient definition as will insure a general harmony in the result, so that the work of one,—excellent, perhaps, in itself,—may not have to be rejected, because it may not harmonise with some others. To illustrate what I mean, I think that instructions to competitors should determine the leading points as follows:—

1. The competition to be for four groups, of not less than three figures in each, illustrating the following subjects:—

a.
b.
c.
d.

} The committee should select the subject (historical, not allegorical).

2. The arrangement of each group to be pyramidical, and no equestrian figure to be introduced.

3. The figures of each group, if standing, to be 12 ft. high (some may think 10 ft. better).

4. The scale of the models to be one-third full size.

5. The material to be Sicilian marble.

6. Sculptors may compete for any one or all of the four groups.

7. The successful competitor to be entrusted with the work, for which £ will be paid.

8. Second and third premiums for each group, of 150*l.* and 100*l.*, will be awarded.

Let me add that I have outlined the above, not for a moment supposing that what I suggest may not be improved, added to, or altered for the better; but only to bring to the surface some of the points requiring to be considered, and I hope sculptors will not fail to criticise and make their own views known through your columns, for it seems no other opportunity will be afforded before the first steps are taken, and then, of course, it will be too late. It is unfortunate that sculptors are not represented by any central body, Academy, Institute, or Society, which could speak in the name of the whole, and individuals, of course, are reluctant to make themselves prominent. I feel sure any good suggestions in this most important and interesting matter would be received by you in all confidence, and must be allowed due weight.

James Edmeston.

THE LONDON AND PROVINCIAL STEAM LAUNDRY.

We must congratulate the company associated under this title upon the possession of what seems to be a very complete set of buildings for their purpose. They are erected in the Battersea Park-road, and cover more than an acre and a half of ground, Mr. Ernest Turner, of Regent-street, having been the architect, and Messrs. Scrivener & Co. the contractors. The machinery has been supplied and fitted by Messrs. Bradford & Co., of Manchester. The works were opened to visitors on Wednesday last, and we had an opportunity of seeing all the working details. The arrangements appear to be excellent, apartments for the various processes succeeding each other, so that the articles treated continually move on until they reach the van by which they are to be returned to their various owners. The general washhouse is a lofty apartment, with an area of about 50 ft. by 30 ft., having down the centre a double row of Bradford's "Vowel A" washing-machines of various sizes. Along the north wall is a range of large-sized pigeon-holes or racks, each capable of containing, when duly folded, just so many socks, napkins, shirts, or what not, as can be introduced at one time into the open mouth of the washing-machine, thus greatly economising the time occupied in charging them. Along the opposite wall is a range of washing and boiling troughs for such articles as may require these methods of handling, with a tramway arrangement by which manipulation is much facilitated. At the north end are the tanks of boiling soap solution, compounded after a recipe which, without the use of chemicals, produces, in some half-dozen turns of the ponderous machine, a lather of proper thickness and fineness. At the opposite end are the "hydros," in which, when washed and rinsed, the various articles are whirled round at the rate of about 400 revolutions per minute, till every drop of extractible moisture is driven off through the open wire sides, without, it is maintained, any of that straining or rending of the fabric

inseparably attendant on the primitive process of wringing. How far this is the case we must leave time and the housewives to determine.

We cannot now pretend to describe the establishment, but will mention a few points that deserve attention.

The ventilation of the boiler-house is unusually complete, and the same may be said of the entire building, special attention having been given to this essential point by the architect.

For infected linen there is a separate department. The infected articles, being collected, not in baskets, but in open wire-work crates, are inserted bodily, without unpacking, into the disinfecting chamber, where they are subjected to dry heat, and the washing, &c., are carried on in the same isolated house.

On the opposite side of the yard are the stables, a fine and well-ventilated range, accommodating at present ten horses, but capable of extension as circumstances may require. Beyond this again is the van-shed, where the white vans of the company, with their blue lettering and smart scarlet wheels and shafts, make a handsome show.

A well, over 400 ft. in depth, has been sunk in the yard, at a cost of something over 600*l*., and extending into the chalk, from which it extracts a supply of water running, if required, to 15,000 gallons per diem, and described by Professor Hehner, of the Analytical Sanitary Institute, as singularly good for the purpose.

As to the sewerage, great care has been taken. Every drain throughout the works runs into a central channel effectively cut off from the common sewer by ventilated manholes, and is thoroughly approachable for inspection and cleansing from end to end. The amount expended may, we understand, be called about 15,000*l*. for the buildings, and 10,000*l*. for the machinery and fittings.

DECORATION OF ST. PANCRAS CHURCH.

During the last two months this well-known church has been in the hands of Messrs. Crace, and it will be again opened for service on Sunday next, October 3rd. An important change has been effected in the aspect of the interior, which, with its walls of "Pompeiian" red, no longer produces that gloomy impression which it before shared with many of its "Classic" sister churches in London. A building with a flat ceiling, 117 ft. long by 60 ft. broad, and only 40 ft. high, may be said to present distinct difficulties to the decorator; but these have been boldly met, and not without success. The ceiling in question is originally divided by very wide margins into a great number of very small panels or shallow coffers, containing at intervals pendent rosettes. The margins are kept light, of a quiet stone tint, and the panels mostly blue, with a Greek star in each, only those being coloured red which emphasise the general design. The proportions of the panels are improved by carrying the blue or red somewhat beyond their own limit. The cornice, which has the demerit of consisting of a great number of small mouldings, without any frieze or leading feature, has been brought out with firm colour and solid gilding. The walls above the galleries are painted a bright, luminous red, whilst below the galleries so much of the wall as is not occupied by the numerous marble tablets is of a darker tone, the window and door dressings throughout being kept light. The gallery fronts are also light, with bronze and gold mouldings, and are divided by ornament into spaces which accord with the columniation below them. The dwarf columns which support the galleries are also treated as bronze, and relieved with gilding. The apse or "tribune" (which already contained three good but somewhat dark stained windows, is now made rich and effective by a series of wide horizontal bands of fine Greek ornament, on gold ground, which well relieves the six heavy verd-antique scagliola columns. These columns are said to be the largest ever made in scagliola, and will be remembered, by those who know St. Pancras, as the leading features of the interior. The topmost of these gold bands bears words (from Isaiah), "Come ye, and let us walk in the light of the Eternal." The high plinth below the columns is decorated principally in a rich morone colour and gold ornament, which is made to connect and frame the white marble tables of the Decalogue, Prayer, and Creed, which already existed. The oak seating remains, and has been renovated. New warming-apparatus, on Grundy's system, has been introduced, and, under the supervision of Mr. Salter, architect, the surveyor of the fabric, other general repairs have been executed. The cost of the works has been undertaken by a committee of the congregation, who have relied entirely upon private subscription. The church was designed by Inwood, and built in 1820-22, at a cost of 76,000*l*. The renovation will cost over 2,000*l*. The Rev. the Hon. Canon Spence is the present vicar, who has actively promoted the work.

WESTMINSTER VESTRY-HALL COMPETITION.

Sir,—As, with your usual courtesy, you complied with the request of the Vestry not to notice these designs until they had been examined by themselves; and as they have now come to a decision without affording you an opportunity of previously expressing an opinion, I ask you, in the interests of justice, which you have ever upheld, to consider and give your opinion as to the decision arrived at. Mr. Charles Barry, it is true, advised it, but strangely ignored the principal condition imposed upon the competitors. This was, that 15,000*l*. was to be the limit of expenditure, inclusive of such a large hall as could be provided within that sum.

Nevertheless, he adjudged the three premiums to three designs, two of which, according to their authors' reports, failed entirely to include the said hall; and the third design, obviously more costly in character than either, ought equally to have been put out of court by Mr. Barry on that ground, as also the elevation sent with it to double the allowed scale.

It will be obvious to you, Sir, that other designs which fulfilled the above-named conditions must have been placed at a disadvantage with these.

In other respects, also, the report which has been published, and the designs themselves, deserve careful consideration, and should be studied in connexion with the instructions to which the competitors were bound to adhere, and which have been treated as a dead letter.

John P. Seddon.

PROFESSIONAL REFEREES IN COMPETITIONS.

Sir,—Now that some architects are trying to prove that the appointment of an architect of eminence produces unsatisfactory results, taking as examples the recent competitions at Glasgow and in Westminster, I think it well to call your attention to a case in which the result has been perfectly satisfactory. Referring to the tenders published in the professional journals last week for the erection of a New Market Hall at Over Darwen, it will be seen that the accepted tenders amount to 13,417*l*., or about 1,500*l*. less than the estimate of Mr. Charles Bell, the architect.

The competition designs were invited last year, and Mr. A. Waterhouse drew up the conditions as well as a report on the designs. The Corporation accepted, without question, the award of Mr. Waterhouse. Mr. Bell was formally appointed architect, and the amount of premium did not merge into the commission.

I think that the memorial to the Institute of Architects by Mr. Cole Adams and his colleagues can do but little, although I was One who Signed It.

P.S.—What a dreadful disappointment to the Richmond Vestry, after selecting a design marked "Natation," believed to be by a local resident, to find "Two Richmonds in the field."

DRAINAGE AND SEWERAGE.

West Bromwich.—A special meeting of the West Bromwich Improvement Commissioners was held on the 16th ult., to consider the sewerage scheme which it is proposed to adopt for the town. Mr. Reuben Farley presided. A plan and explanatory report with reference to the scheme were presented by the town surveyor, Mr. John J. Eayrs, C.E. The report set forth that the returns for the year 1879 showed that the population of the township was 53,639, and for the purposes of his calculation Mr. Eayrs had taken the population at 54,000. In the year referred to there were 10,800 houses. At present the sewage and surface-water was discharged into the River Tame, Birmingham and Tame Valley Canals, and certain watercourses. The estimated quantity of sewage per twenty-four hours was 1,609,950 gallons, and with the estimated increase it would be 2,414,850, which would have to be provided for. In the opinion of Mr. Eayrs the "separate system" of sewerage would be the best for the township. The plans provided for the drainage into the Westbromwich system of 270 acres of Smethwick, with a present population of 2,985, and an estimated increased population of 4,475. The land proposed to be purchased for the purification of the sewage was known as Friar Park, and was situated at the western extremity of the parish, adjoining Bescot Station and land about to be purchased by the corporation of Walsall for the disposal of sewage. The area of the land for Westbromwich was 287 acres, provisionally purchased from the Right Hon. the Earl of Dartmouth, tithe-free, for 20,000*l*. The system of intermittent downward filtration was recommended for the disposal of the sewage of the parish. The report further set forth that it was proposed to carry out the drainage scheme in three sections, and the plans now drawn up provided for the first section, which, it was estimated, would cost 54,726*l*. 11s. 9d. A resolution was passed approving of the plans and first section of the scheme drawn up and presented by Mr. Eayrs, and requesting the sanction of the Local Government Board to a loan of 60,000*l*. from the Public Works Loan Commissioners, the repayment to be spread over a term of fifty years.

Nairn.—A system of drainage has lately been completed at Nairn, at a cost of about 3,000*l*. Instead of running the sewage into the sea, it was resolved to apply it to the irrigation of a piece of waste ground for the growth of grass or other produce. The drainage had to be carried across the river, and for this purpose two piers, consisting of iron cylinders filled in with concrete, were sunk. The pipe,—an 18-in. iron pipe,—was laid upon them, and with footboards and hand-rails on the top of it, the pipe has been converted into a foot-bridge, which has proved a great public convenience. The level of the pipe being higher than the ground on the other side, a large embankment was raised, in which the pipe is embedded, and the top of the embankment is utilised as a public walk. The place selected for the sewage farm was known as the Salt Marsh. The soil was very thin and poor, and the subsoil consists of sand and gravel. The place was let for a few pounds as a grazing outlet to a neighbouring farmer. The first work of the engineer was to devise means to keep back the tide. This he has succeeded in doing by building in the heart of the embankment a dyke of clay, going down to the rock. At present only ten acres are being treated for the utilisation of the sewage. Its distribution is carried on by a series of channels cut in the ground, and is completely under control, one part being treated one day and another the next. The cost of the work in disposing of the sewage, including building, &c., is about 1,542*l*., of which 200*l*. has been expended in levelling the ground.

SCHOOL-BOARD SCHOOLS.

Great Grimsby.—The second new school erected by the Grimsby School Board was opened a few days since. It is in the West Marsh, on a fine open site given by the Corporation. It has two main fronts, to South Parade and Fildes-street. It accommodates 260 boys, 260 girls, and 260 infants, and each department contains a large main school-room and three class-rooms, together with teacher's rooms, &c. A caretaker's house is placed at the angle of the two fronts. This has an octagon slated roof. The buildings are of good local pressed bricks; the windows having Bath stone lintels and sills, with blue brick bands. The roofs are slated, with red ridges. Each of the playgrounds is tar-paved, and has a covered playshed. The desks are all on the dual system, made in the town from Messrs. Colman & Glendenning's pattern. The total cost, including fencing, paving, playgrounds, fittings, architects' commission, &c., but exclusive of site, has been 5,377*l*., or less than 7*l*. per child. The architect is Mr. Charles Bell, and the builders are Messrs. Riggall & Hewins, Grimsby.

Newcastle-under-Lyme.—The School Board here is erecting schools in the Barracks-road, to accommodate 1,000 children. Messrs. Chapman & Snape, of Newcastle, are the architects, and Mr. John Gallimore is the contractor, the amount at which the contract was taken being 3,847*l*.

At the Exhibition just held in Leyden, Holland, a gold medal was awarded to Messrs. Wurr & Lewis, of 11, Lawrence Pountney-lane, Cannon-street, London, for their improved hand-power circular and band-sawing machine, and for their mortising and boring machine.

Books.

A Handbook for Painters and Art Students on the Character and Use of Colours, their Permanent or Fugitive Qualities, and the Vehicles proper to Employ. By W. J. Muckley. Baillière, Tindal, & Cox, London, 1880.

Most persons on noticing the title of this book and its publication at the present juncture will have supposed, as we did, that it was a kind of corollary to the protestation which has recently been made on the subject of colouring materials by certain painters. The author, however, specially mentions that it was in the press some weeks before Mr. Holman Hunt read his paper on "Painters' Materials" at the Society of Arts in April last. Mr. Muckley seems to have done eminently good service in bringing out a book of this kind on such a subject—a book short, concise, and practical, giving not a word more than is necessary, and based on long practical experience. The treatise is preceded by a brief preface by Mr. Poynter (to whom it is dedicated), expressing his concurrence in the views of the author, and his high opinion of Mr. Muckley's judgment on the subject. For the many readers who go by names it may no doubt have been necessary to provide the book with some such warrant from an artist of established fame, and Mr. Poynter, as the official head of the Government schools of art, was on other grounds a peculiarly suitable referee. Those who have knowledge of the subject will at once perceive that the author understands it; but then they are not the people who most need the book.

The author rightly urges, in his own preface, that the artist has no right to neglect the subject of permanence of pigments and allow himself to be careless about it as a prosaic matter. If he does not care about his own future fame, he has no right to disregard the interests of those to whom he has sold pictures, under the supposition that they will be permanent possessions, and he incurs a culpable responsibility if he wilfully neglects all care about the stability of the materials with which they are painted. *Caveat emptor* cannot rightly apply here, because the buyer is exactly the person who cannot know much about the matter. Even if the purchaser knows anything about the chemical composition and action of pigments, vehicles, and varnishes, he cannot know what the painter has used, and how he has used it. "It therefore becomes all the more imperative on the painter's part that he should thoroughly deal with it as a necessary part of his education and practice, or in ignorance he may lay himself open to the charge of supplying to his client that which he did not bargain for."

Mr. Muckley first ranges under the head of "Permanent Colours," the colours which he thinks can be justly so called, subdivided under the heads of whites, yellows, reds, blues, greens, and browns. The constitution of each colour, whether vegetable or mineral, is briefly mentioned, and any particular quality in it, either good or bad, which requires special attention. The only deficiency we find in this portion of the book is that the author does not clearly state whether all his remarks refer equally to the behaviour of the colours whether used as oil or as water colours. In general they probably would apply equally to either, though there must, we should imagine, be some cases in which a pigment may be permanent with oil and not with water, or *vice versâ*. We appear to be worst off in the matter of yellows, in regard to which Mr. Muckley seems to be generally sceptical; for though he says lemon yellow is the only yellow the painter can use with safety, he afterwards speaks very disrespectfully even of that: indeed, his remarks on it are contradictory. "It is the only colour of the kind on which we are at all able to rely, and this varies so often,—both as to purity of colour and density, that it will rarely ever serve the purpose of a primary. It should therefore be regarded with suspicion." It is certainly not a very powerful or effective yellow, as the author elsewhere admits. Cadmium yellow, the most powerful of yellow pigments, is placed by the author among the colours of inferior permanence. Yellow ochre he believes in, and Naples yellow "under all ordinary conditions." It again, however, seems rather a contradiction to be told that the old masters used yellow ochre a great deal, and elsewhere to read that "no permanent true yellow pigment appears to have been discovered by the ancients suitable for the painter's use." "The transparent vegetable yellows have been used during the last three centuries, in combination with blues, to form greens. In all cases these yellows have flown away, and only the blue colour with which they were originally mixed has remained." The opaque yellows from arsenic have gone in a different way, from damaging the colours combined with them. Altogether, the advice in regard to using yellow seems nearly to amount to that once given to people about to marry,—"Don't." However, people will go on marrying, and painters will use yellow, and perhaps both will get along somehow.

The reds and the blues are better behaved colours. The madders and vermilions used by the early painters have retained their power and purity, Mr. Muckley finds, down to the present day; though one result of this is that they now appear far too strong and brilliant for their surroundings. "Many reds," adds the author, "have been added to the old list, but they are either ineligible, or require the greatest care in the use of them." Among reds of inferior permanence, which change certainly when combined with others, and probably when alone, an old and much-used friend, crimson lake, is gibbeted. Carmine is even in worse case, the old colour; but madder carmine may be trusted. Of the decided red colours the author recommends vermilion, Venetian red, and light red, the latter being, in fact, "yellow ochre calcined to redness." Of the blues, ultramarine, of course, the queen of colours, takes the lead, and cobalt and French ultramarine stand well. Smalt, Prussian blue, Antwerp blue, and indigo are all condemned,—a sad levelling of old and respectable reputations. We must leave the reader to look up greens, greys, and browns, and study the remaining matter in regard to the primaries, in the book itself, which most people who have to make practical use of pigments will probably purchase. At the end of the chapters on the choice of colours are given three tabular lists,—the first, of permanent and reliable colours; the second, of those doubtful and unreliable; the third, of colours so fugitive that they should never be used; "and if colour-makers would cease from manufacturing them it would be of the greatest importance to the art." Among these last are found such well-known and often-used colours as Indian yellow, rose pink, chrome green, &c.

To this part of the book succeeds a very useful and tolerably full consideration of vehicles or mediums and their use and abuse, followed by other general suggestions in regard to the use of the painter's tools, some of which are comprehensive and very pithily expressed. Mr. Muckley recommends the habit to be early formed of using large brushes. The student will thus be obliged to work slower and with more deliberation. "When painting with large brushes, every stroke must be well guided, or confusion and emptiness will soon be the result. Every touch, when well directed, will probably be the just embodiment of the eye, the mind, and the hand, which last should ever be the obedient servant of the two other agents. The hand should never be permitted to work on its own account, a habit which we so constantly see. . . . . The use of small brushes favours poor work. They do not require so constantly directing as large ones do." The spirit-rapping "medium" in Mr. Browning's poem says about pens,—

"Who knows if you drive them or they drive you?"

and Mr. Muckley, without being a "medium," seems to suggest that the question may reasonably put as to brushes. The attention of architects may be directed to the remarks as to the lighting of studios for various classes of painting, and the treatment and colouring of the walls (pp. 73-75).

In regard to the preparation of colours and materials, the author comments on the very different condition under which painters work now, when everything is supplied to them ready made, and the artist may, as *Punch* suggested, "have nothing to do but just shove the colours on," as compared with the time when painters occupied a great deal of their own time and attention in preparing canvasses, brushes, colours, and vehicles. Under those circumstances an artist at least knew pretty well what he was working with, and Mr. Muckley seems to think, not unreasonably, that this practical work was not without its good effect on the artist, "sharpening the appetite of the real student, making him doubly eager to follow the more pleasant part of his occupation when the time arrived for him to do so." We may add that to every man whose main occupation is æsthetic or ideal, some degree of practical occupation is most valuable, as preserving the balance of the faculties and the character. We are not expecting that artists will take to mixing their own varnishes and vehicles again, or grinding their own colours; but the fact that it is all done by tradesmen for them now has at least this drawback, that the interest of the tradesman is merely to sell colours; he has no direct interest in making them permanently fitted for their work in the best way; whereas the painter who mixed his own colours had the ultimate result at heart. But the same dealer sells, indifferently, permanent and fugitive colours, and cares not which, so long as he does sell them. Now, says Mr. Muckley, "Let some colourman begin anew, by taking special care that all the materials which come into his hands are pure, and that the washing and grinding of certain pigments be as perfect as possible. Let him also supply only those colours which he knows to be of the best quality and permanent. Or if he chooses to sell those which are semi-permanent, let this be indicated on the usual label attached to the tube or cake, so that painters may be made aware with what they have to deal. The price of such materials might be raised according to the extra time and care given to their preparation. There can be no doubt that any colourman who would take up the business in this form would soon have the best part of it to himself, for at the present time no such person exists. The formation of a body or society for the preparation of painters' materials, under the immediate control and direction of painters of repute, would doubtless be still better." The mere additional cost of making colours carefully should count for little or nothing in the matter, when we consider the importance of the subject to art and artists, and when we realise that "from a few tubes of colour, of small comparative cost, a work of the value of hundreds, and sometimes thousands of pounds, is often produced." With which practical quotation we take leave of a very practical and useful little book.

VARIORUM.

"The Electric Light for Industrial Uses," by R. E. Crompton (Mansion House-buildings), although only a pamphlet, and having to some extent a personal motive, gives some plain, straightforward information on the subject, which many are seeking for.——Mr. John H. Webber has published, on a sheet, sketches of some of the numerous memorials of eminent Nonconformists to be found in Bunhill-fields burial-ground.——The *Magazine of Art* has a touch at our ugly street-lamps:—"A lamp in Paris or Brussels is an elegant object, of a sort of bronze, tapering up, with a little half-raised decoration of leaves running round, and crowned with a pretty lantern. The lantern is the chief and all-important feature, the post being merely to support it. But here some kind of glass "thing" is perched on the top of a massive cast-iron pillar. Then this bulk is a waste of strength and emphasis. So, too, with the newly-introduced lanterns in the City, made in the shape of cylindrical cups out of one piece of glass. This was suitable in the case of the old oil-lamps hung out by a branch from the wall, and when the light was cast downwards; but here the absurdity has to be introduced of breaking a hole in the lower spherical surface to introduce the gas-jet. This clumsy device actually interferes with the light."——In the first number of the new serial, "Egypt" (Cassell), readers are reminded that the ancients took pains in laying out their cities. This is the course that was followed in laying out Alexandria:—"Orders were given for the measurement of the ground and foundations, and the architect, Dinocrates, was commissioned to prepare a plan. This took the form of a Greek *peplum*, or of a fan, and the work of indicating the direction to be followed by the roads, and the extent of the market-places, was begun by strewing white earth on the level ground. The supply of this material falling short, it was supplemented by the assistants of the architect taking the meal which had been provided in abundance for the labourers. The legend goes on to say that hardly had this been sprinkled on the soil when numbers of birds came flying down to feed on the welcome supply of food. Alexander hailed the appearance of these feathered guests as a favourable omen, signifying the rapid prosperity and future

wealth of the city."——"The art of Fan-painting," from the French of the Baronne Delamardelle (London: Lechertier & Co.), gives information which will be found useful by those who desire to attempt the practice of this pleasant and sometimes profitable art.

Miscellanea.

Sale of the Royal Dramatic College.—This ill-starred building found a purchaser in the person of Mr. Chabot, the "expert" in handwriting, to whom the trustees, under an order of the Charity Commissioners, have sold it for a very small sum over the reserved price of 5,000*l*. Considering that the building has been sold along with the grounds, containing ten acres of freehold land adjoining the South-Western Railway, the purchaser is said to have secured a bargain. Mr. Chabot has bought the building entirely on speculation. Last week the furniture and fittings of the twenty dwelling-houses of the pensioners in the college, together with those in the great central hall, and the out-door effects were sold. The pictures, drawings, and a variety of other gifts of considerable value, together with a library containing upwards of 1,500 volumes will shortly be sold in London; and it is stated that the Charity Commissioners have directed that the proceeds of the sale of the college and effects are to form a fund for the benefit of the pensioners of the college.

Fall of Buildings.—On Thursday in last week, about half-past nine in the evening, the greater part of the back of the premises, No. 34, Knightrider-street, Doctors' Commons, suddenly fell into the roadway of Peter's-hill, completely blocking up the thoroughfare with the *débris*.—— A singular accident occurred about a quarter to ten on the previous evening in White Hart street, Drury-lane, where the pavement in front of the shop of Mr. Prendergrass suddenly fell in without any warning. It would appear that the pavement is built on a succession of vaults, although the houses have no connexion with them, the foundations of the latter being quite independent. Some two months ago the parish had occasion to repair the drain in the immediate neighbourhood of this shop, and this is believed to have interfered with the stability of the wall between the fallen vault and the one next to it. Fortunately no one sustained personal injury by either accident.

Profit of Public Works.—M. de Labry has written an essay, in which he discusses the various advantages of public improvements to invested capital, to adjacent regions, and to the Government, showing that the dividends to stockholders and the direct revenues of Government constitute only a small portion of the benefits conferred by increased facilities for travel and the transportation of merchandise. He thinks that both self-interest and duty should prompt the inhabitants of regions which have been well developed to contribute towards the opening of new districts. Even if the contributions appear to be sunk, the increase of trade and of general prosperity will, almost without exception, amply repay all the outlay.—*Ann. des Ponts et Chauss.*

Tramways, Great Grimsby.—The Provincial Tramway Company are now laying about four miles of line in this rapidly-rising seaport, which will no doubt be a boon to the inhabitants. Messrs. Davis & Emanuel, of London, are the engineers for the works, which are being executed under the superintendence of Messrs. Maughan & Cuxson, of London and Grimsby (as resident engineers) by Messrs. Riggall & Havins, contractors, of Grimsby. It is expected that the lines will be opened early in January next.

Candidates for District Surveyorships. At the meeting of the Metropolitan Board of Works, on this Friday, Oct. 1, the Board are to consider a letter from the Royal Institute of British Architects, stating that they are desirous of improving the character of the statutory examination of candidates for certificates of competency to perform the duties of a district surveyor in London, and that they have discussed the advisability of imposing a moderate fee upon each candidate, and inquiring whether the Board would acquiesce in such a course.

Arnold Sewerage Works.—Mr. Frederick Jackson, C.E., Nottingham, is the engineer for the above works, the tenders for which we printed last week.

Defective Gas Mains.—Large street excavations have just been made in the Mile-end-road and other East-end thoroughfares on account of the discovery that a very considerable quantity of gas was escaping at some points of the gas mains into the street sewers. It became absolutely necessary to make an immediate examination, and, as the subway system is not in operation in the district, the streets had to be opened up in order to get at the defective parts of the mains so as to make them gas-tight.

Exhibition of Gas Apparatus, Glasgow. Under the auspices of the Philosophical Society of Glasgow there is now being held an exhibition such as has never previously been held in Scotland, and such, indeed, as has never been equalled in the United Kingdom, if we consider its extent and variety, and the great degree of scientific interest attaching to the collections of exhibits in several of the departments. Briefly it may be called a Gas Apparatus Exhibition, but it is that and a great deal more.

School of Art Wood-Carving. — Free studentships in both the day classes and the evening classes of the School of Art Wood-carving, at the Royal Albert Hall, Kensington, are at present vacant. These studentships are maintained out of funds provided by the City and Guilds of London Institute for the Advancement of Technical Education. Forms of application and prospectuses of the school may be obtained on application to the Secretary.

Brixton.—A stained-glass window has been presented to St. John's Church, Angell Town, by Mr. Charles Mansfield, of the Burton-road, in memory of Sarah his wife, who died on the 1st of May last. It is a two-light window, and the subjects represented are scenes at our Lord's Resurrection. The work has been executed by Messrs. Heaton, Butler, & Bayne, under the superintendence of Mr. Harley M. Grellier.

Cemetery for the Parish of St. Mary Cray.—Designs for chapel, mortuary, lodge, laying-out roads, &c., are invited in competition. More than one correspondent have pointed out that the stipulated expenditure, 1,200*l*., is too small for what is asked for, and that designs cannot be prepared properly by October 16th as required.

Hanley School of Art.—The Hanley School of Art, which has done much useful work in promoting good design in English pottery during the last quarter of a century, is about to be re-opened, after the enlargement of its buildings at a cost of about 2,500*l*. The committee appeal for subscriptions towards meeting this outlay.

Safety of Canterbury Cathedral.—Attention has been properly drawn to the dangerous condition of the staircases leading to the top of the central tower through the accumulation therein of inflammable matter carried in by birds.

Dublin.—The erection of the (R.C.) church of St. Agatha, North William-street, Dublin, has been commenced. The new church will be 154 ft. in length, 45 ft. in width, and 33 ft. in height. Messrs. O'Neill & Byrne are the contractors, and Mr. Toole is the architect.

Photographic Society of Great Britain. The private view of the annual exhibition of photographs will take place this Saturday, October 2nd. It will be opened to the public on Monday, the 4th inst.

Sewer Gas.—Five men have been killed in clearing out a short length of sewer in Paris by the foul gas which it appears to have contained.

Clonakilty.—The opening of the (R.C.) Church of Mary Immaculate, Clonakilty, took place on the 25th ult. It has been built at a cost of 29,000*l*. from designs by Mr. Ashlin, of Dublin.

TENDERS

For forming new roadway and sewer in Adpar-street Edgware-road. Mr. Gundry, architect:—

	Sewer.	Road.
Williams & Co.	£740	£950
Mowlem & Co.	710	795
Nowell & Robson	650	840
Keeble	620	860
Boyer	670	782
George	645	800
Killingback	644	755
Neave & Son	609	750
Burford & Ball	500	750
Alldred	468	728

For building five warehouses on Great Saffron-hill, for Mr. John Jaques. Messrs. J. & S. F. Clarkson, architects. Quantities not supplied:—

Langmead & Way (accepted).

For the erection of new stable buildings, Great Enton, Witley, Surrey, for Mr. F. E. Eastwood, J.P. Mr. Henry Peak, architect:—

Martin, Wells, & Co., Aldershot and London (accepted) £2,147 0 0

For range of glass houses, potting-shed, and garden walling, Great Enton, Witley, Surrey, for Mr. F. E. Eastwood, J.P. Mr. Henry Peak, architect:—

Martin, Wells, & Co. (accepted) £767 5 0

For new stable and coachhouse, "Greylands," Horsell, Woking Station, for Mr. J. P. Fitzgerald. Mr. Henry Peak, architect:—

Gale, Woking Station	£695 0 0
Wilson, Woking Station	583 0 0
Butt, Woking Station	545 0 0
Harris, Woking Station	486 10 0
Shears, Maybury (accepted)	350 0 0

For house, Seven Sisters-road, for Mr. E. Jarrett. Messrs. Lee & Tregelles, architects:—

Conder (accepted) £1,570 0 0

For workshops, &c., Southampton-mews, Euston-road for Mr. T. Hughes. Mr. G. P. Raggett, architect:—

Grover	£2,583 0 0
Patman & Fotheringham	2,549 0 0
Macey & Sons	2,494 0 0
Bird	2,395 0 0
Conder	2,367 0 0
Scrivener & Co.	2,294 0 0

For roads and drains, Oakfield Estate, Ashtead, Surrey. Mr. John Norton, architect:—

Ford & Co.	£5,900 0 0
Dyer	4,880 17 6
Norris	4,884 12 10
Sibsey	4,570 0 0
Crockett	3,335 0 0
Burford & Ball	3,190 0 0
Impey	2,980 11 10
Bloomfield	2,776 0 0
Catley	2,715 9 9
Blake	2,665 18 0
Strachan & Co.	2,603 19 11
Woodham Bros.	2,505 0 0
Botterill	2,499 0 0
Bell	2,389 0 0
Peill & Sons	2,345 0 0
Rigby	2,150 0 0
Hancock, Jun.	2,075 0 0
Cole	1,926 6 0
McKenzie & Co.	1,810 0 0
Kavanagh	1,736 0 0
Caulton	1,527 14 0
Taylor & Co.	1,493 7 6
Putney	1,386 0 0

For new Congregational Church, Widmore-road, Bromley, Kent. Mr. J. Sulman, architect. Quantities supplied:—

Austin	£7,648 0 0
Higgs	6,850 0 0
Reading	6,617 0 0
Linzell	6,560 0 0
Staines & Son	6,194 0 0
Hollidge & Stuart	6,230 0 0
Hobern	6,060 0 0
Lowe	6,133 10 0
Bowyer	6,188 0 0
Smith & Son	6,0 4 0 0
Batley	5,900 0 0
Garrud	5,651 0 0
Arnaud	5,688 0 0
Beale	5,525 0 0
Crossley	5,495 0 0
Grubb	5,235 0 0
Stephens & Bastow (accepted)	5,299 0 0

For the erection of Nos. 3, 4, and 5, Wychombe Studios, Haverstock-hill:—

Nash	£2,230 0 0
Gregory & Bruce	2,224 0 0
Gould & Brand	2,098 0 0
Langmead & Way	2,050 0 0
White (accepted)	1,989 0 0

For alterations and additions to the Royal Oak Tavern, York-street, for Messrs. Murrell. Mr. W. E. Williams, architect:—

Edgar	1,669 0 0
Perkins	1,433 0 0
Yeo	1,321 0 0
Marr	1,287 0 0
White	1,249 0 0
Mark	1,223 0 0

For alterations and additions to the Green Man Public-house, Edgware-road, for Mr. John Hancock. Mr. Josiah Houle, architect:—

Temple & Foster	£1,288 0 0
Mark	1,239 0 0
Canning & Mullins	1,177 0 0
Langmead & Way	1,130 0 0

For re-erecting a part of the Royal Oak Brewery, Croydon, for Mr. F. Overton. Messrs. Seamell & Colyer, engineers. Quantities by Messrs. Curtis & Son:—

Morter, Stratford	£2,347 0 0
Smith & Sons, Islington	2,320 0 0
Boiler.	
Horton & Sons	£385 0 0
Copper Coil, &c.	
Pontifex & Sons	604 0 0
Millwrights' Work.	
Thornewill & Warham	603 0 0

For roads and sewers, Abbey Lodge Estate, New Wimbledon, for Messrs. Tenten, Robottom, & Co.:—

Martin & Welmarsh	£4,000 0 0
Ellis	1,300 0 0
Blackmore	1,050 0 0
E. & W. Iles	1,041 0 0
Harris	894 0 0
Jackson	866 0 0
Pizzey (accepted)	858 0 0
Taylor	587 0 0

For a school on the Limes Estate, Croydon. Mr. Charles Henman, architect:—

Bellham & Co., Buckingham Palace-road	£955	16	0
Taylor, Croydon	925	10	0
Laing & Co., Parliament-street	913	0	0
Holt, Croydon	884	16	4
Marriage, Croydon	869	10	0
Clark & Bracey, Coleman-street	839	0	0
Smith & Sons, South Norwood*	763	0	0

* Accepted.

For a residence, Birdhurst-road, Croydon. Mr. Charles Henman, architect:—

Humphries, Sutton	£2,670	0	0
Laing & Co., Parliament-street	2,468	0	0
Glaskin, Croydon	2,399	0	0
Williams & Son, Canonbury	2,360	0	0
Taylor, Croydon	2,319	0	0
Bellham & Co., Parliament-street	2,202	1	8
Marriage, Croydon	2,200	0	0
Smith & Sons, South Norwood*	2,117	0	0

* Accepted.

For a residence, Radcliffe-road, Addiscombe. Mr. Charles Henman, architect:—

Goddard & Son, Farnham	£4,265	10	0
Jarrett, Croydon	4,100	0	0
Macey & Sons, Strand	4,040	0	0
Marriage, Croydon	3,970	0	0
Laing & Co., Parliament-street	3,960	0	0
Glaskin, Croydon	3,887	0	0
Smith & Sons, South Norwood*	3,709	0	0

* Accepted.

For the erection of five cottages and corner shop at Hemel Hempstead, Herts. Mr. Walter T. Feldon, architect:—

Monk	£1,300	0	0
Flint	1,100	0	0
Horn	1,060	0	0
Philbey, Hemel Hempstead*	835	0	0

* Accepted.

For villa residences at West Heathfield, Twickenham, for Mr. D. W. Palmer:—

	One Pair.	Two Pairs.
Pillar	£795	£1,580
Potter	700	1,400
Cordery	700	1,380
Coney	704	1,358
Collier	700	1,340

For erecting shop at Old Southgate, for Mr. T. Sugden. Mr. William Smith, architect:—

Shurmur	£482	0	0
Harper	476	0	0
Dunford & Langham	466	0	0
Newby	456	0	0
Steele Bros.	450	0	0
Larke	443	0	0
Wheeler	427	0	0

For proposed additions to Wycliffe Hall, Oxford. Mr. Wm. Wilkinson, architect:—

Castle	£3,280	0	0
Dobson	3,275	0	0
Frankland	3,080	0	0
Wyatt & Sons	2,916	0	0
Symm & Co. (accepted)	2,777	0	0

For erecting seven shops adjoining the Upland Tavern, North-cross-road, Crystal Palace-road, East Dulwich, for Mr. W. Sayer. Mr. G. Treacher, architect:—

Gill, Wandsworth-road (accepted)	£4,500	0	0

For alterations and repairs at the North Pole, Shadwell. Messrs. Perry & Reed, architects:—

Mark	£720	0	0
Staines & Son	688	0	0

For sundry repairs and re-decoration of Mayfield Chapel, Dalston:—

Repairs to Exterior.

Barber & Co.	£357	0	0
Jarvis & Sons	270	0	0
Shurmur (accepted)	189	0	0

Re-decorating Interior.

Goodman	525	0	0
Snook	419	0	0
Campion	393	0	0
Jarvis & Sons	300	0	0
Shurmur	279	0	0
Barber & Co. (accepted)	238	0	0

For addition to swimming-bath, Public Baths, Maidstone. Mr. Edward W. Stephens, architect:—

Smith, Maidstone	£429	0	0
Naylar, Rochester	409	0	0
Bartholomew, Maidstone	405	10	0
Cox, Bros., Maidstone	391	0	0
Elmore, Maidstone	390	0	0
Avard, Maidstone	386	0	0
Wallis & Clements, Maidstone	386	0	0
Simmonds, Maidstone	377	0	0
Vaughan, Bros. (accepted)	339	0	0

For fittings, &c., at Cheshire Cheese, Addle-street, Cheapside. Mr. H. J. Newton, architect:—

Hockley	£378	0	0
Shurmur	333	0	0
Lascelles	283	0	0
Anley (accepted)	215	0	0

New Counter.

Warne	£144	0	0
Hellings	137	10	6
South	134	0	0
Sanders & Son	119	4	0
Paddon (accepted)	119	0	0

Plate Glass and Embossing.

Gibbs, Blackfriars-road (accepted)	144	0	0

For erecting smoking-saloon and enlarging polo-pavilion, decorating dining-room and saloon, at Hurlingham, for the committee of the Hurlingham Club, Fulham. Mr. Joseph S. Moye, architect:—

Saala (accepted).

For the erection of new spinning-shed at Shaftesbury House, London-fields. Messrs. Lee & Walton, architects:—

Rider & Son	£353	0	0
Barrett	345	0	0
Boyce	328	0	0
Jarvis & Sons (accepted)	310	0	0

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